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1985 HAMILTON-WENTWORTH COLLISION REPORT

PREPARED BY:
THE CITY OF HAMILTON TRAFFIC DEPARTMENT

1985 HAMILTON-WENTWORTH COLLISION REPORT

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007595

1985 HAMILTON-WENTWORTH MOTOR VEHICLE COLLISION REPORT

Introduction

This annual report is a summary of factors associated with traffic collisions that occurred in the Regional Municipality of Hamilton-Wentworth in 1985.

The Regional Municipality of Hamilton-Wentworth is situated in southern Ontario, at the westerly end of Lake Ontario. The following Municipalities are located within the Region: The Town of Ancaster, The Town of Dundas, The Township of Flamborough, The Township of Glanbrook, The City of Hamilton and the City of Stoney Creek. The total population of these combined localities was 421,264 in 1985.

Traffic collisions are a primary cause of accidental deaths (Appendix Exhibits A-1, A-2, and A-3), injuries and associated property losses. The intention of this report is to provide factual information to those agencies and persons concerned with the safety of the roadway transportation system within the Regional Municipality of Hamilton- Wentworth.

Traffic collisions frequently involve complex interactions between human behavior, vehicle characteristics, and the environment. The factor or factors responsible for causing a collision are not always the most obvious nor are they always readily apparent. Caution should be exercised in drawing conclusions from the statistics presented in this report and conclusions should be drawn only with appropriate qualifications and supportive information.

The information recorded in this report is based primarily upon motor vehicle accidents investigated by the Hamilton-Wentworth Regional Police. Information about accidents recorded by other police forces, (such as the Ontario Provincial Police) has not been included. This generally excludes incident's occurring on King's Highways (including the Queen Elizabeth Way) that pass through the Region.

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1985 HAMILTON-WENTWORTH COLLISION REPORT

Executive Summary:

* In 1985, 7,346 reportable traffic collisions occurred on municipal roadways in the Region of Hamilton-Wentworth. These collisions resulted in:-

- 23 driver or passenger fatalities (9 motor vehicle drivers, 4 motorcyclists, 2 bicyclists and 8 riders or passengers)

- 3 pedestrian fatalities

- 4,119 driver, bicyclist or passenger injuries

- 408 pedestrian injuries

- 21,405 persons (equal to approximately 5 percent of the Regional population) being involved in a reportable traffic collision in 1985

- approximately 17.4 million dollars in property damages (as estimated at the time of the collision)

- 46 million dollars (estimated) in damages when all collision costs including medical costs, loss of income and other related costs are taken into account (see Note 2.3)

* The overall frequency of collisions in Hamilton-Wentworth is generally lower than other major Canadian municipalities.

* The overall frequency rates of fatalities in the City of Hamilton are generally lower than other Canadian and U.S. cities of similar population.

* The period from 12 midnight to 5 a.m. exhibits the highest ratio of collisions to vehicle volume using the street system.

* The greatest causes of traffic collisions were driver or pedestrian error; either errors in judgement or perception, or non-observance of traffic regulations.

* The predominant improper driver actions indicated in collisions were "following too close" and "failure to yield right-of-way".

* Drivers under 20 years of age were involved in a disproportionate number of collisions relative to the number of drivers in this age group that are licenced to drive. This age group was involved in 9.5 percent of the reported collisions although it comprises only 5.5 percent of the licenced driving population.

* 8.8 percent of reported collisions involved one or more drivers who had been drinking.

* Alcohol was associated with a high proportion of collisions (42 percent) which occurred in the hours between 10 p.m. and 3 a.m. from Wednesdays to Sundays and in night-time collisions (21.5 percent of collisions between 6 p.m. and 6 a.m.).

Note: These figures are indicative of alcohol being present in the bloodstream of one or more of the drivers involved in the collision and do not necessarily suggest that alcohol was the proximate cause of the collision.

* Non-licenced drivers were less likely to be driving properly, and more likely to be under the influence of alcohol or drugs when involved in a collision.

* Motorcycle operators were more likely to be driving properly at the time of the collision and more likely to receive injuries if involved in a traffic collision.

* Children between 5 and 9 years of age were involved in a disproportionate number of pedestrian collisions (21.1%) compared with their proportion of the regional population (6.5%). Pedestrians in this age group were most frequently involved in a collision as the result of entering the roadway unexpectedly; that is, running into the roadway or entering the roadway from behind a parked vehicle or object.

* Vehicle defects were reported in 1 percent of the vehicles involved in collisions. It should be noted that the presence of a recorded vehicle defect does not necessarily suggest that it was the proximate cause of the collision.

1985 COMPARED WITH PREVIOUS YEARS

A comparison of the collision statistics for 1985 with those for previous years indicates noticable differences in four areas as follows.

1. Overall Collisions

One hundred and eighteen more collisions (1.6%) occurred in 1985 than in 1984. Consistent with this increase in collisions, the occurrence of injury collisions, persons injured and fatalities in the Region were all higher by between 15.7 percent and 44.4 percent compared to 1984.

2. Bicycle Injuries

The number of people injured in motor vehicle collisions while riding on a bicycle rose from 178 in 1984, to 244 in 1985. For the years 1980, 1981, 1982 and 1983, by comparison, the number of cyclists involved in collisions was 182, 165, 254 and 202 respectively.

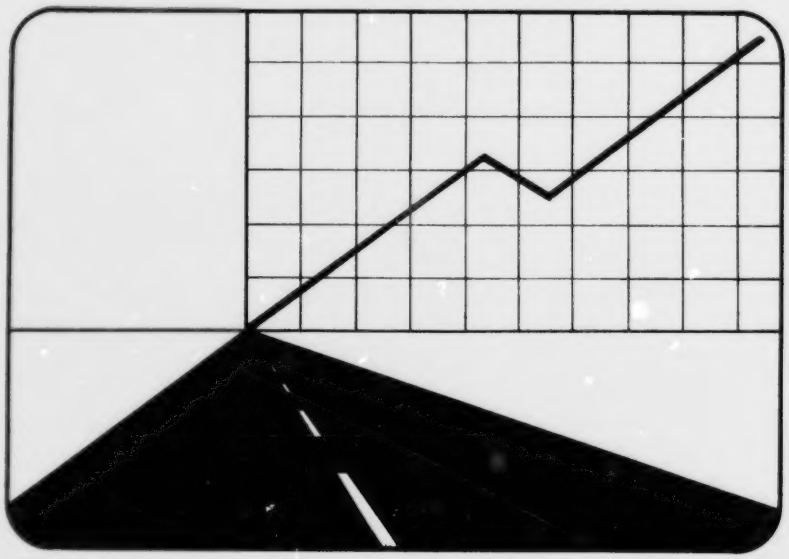
3. Pedestrian Collisions Involving Five to Nine Year Olds

Collisions involving five to nine year old pedestrians rose from 51 in 1984 to 86 in 1985, an increase of sixty-nine percent. For comparison, data for the years 1980 through 1983 were 90 collisions, 72 collisions, 107 collisions and 79 collisions respectively.

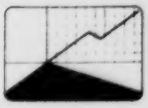
4. Sixteen to Nineteen Year Old Involvement

The 16 - 19 year old age group of drivers is much less likely to be driving properly when involved in a collision than the overall average. However, in 1985,this age group was involved in fewer collisions per capita than in 1984 and was no more likely to be involved in a collision than the 20 - 24 year old group.

In 1985, sixteen to nineteen year old drivers were involved in fewer motor vehicle collisions following the consumption of alcohol than in 1984. The number of collisions involving 16, 17 and 18 year olds who had been drinking or were impaired was 2, 12 and 18 respectively, versus 4, 14 and 25 respectively in 1984. Since January 1, 1984, the legal drinking age in Ontario has been 19.



Chapter One
Trends



General

Since 1951, the number of motor vehicle collisions and persons injured in motor vehicle collisions in Hamilton and Hamilton-Wentworth has increased (Exhibits 1-4, 1-5, 1-6). However, in the same time period, the population of the reporting area has more than doubled and motor vehicle registrations have risen by a factor of 3 (Appendix Exhibit A-4). There is also evidence to suggest that, with an improving highway system, each registered vehicle is driven a greater distance annually. The effect of increased population, vehicle registration and vehicle use is increased opportunity for motor vehicle collisions to occur.

Normalizing the Data

To fairly assess historical trends, collision data should be expressed in terms of rate (normalized) through the use of one of several factors. Annual motor vehicle use information would provide the most accurate assessment of a motorist's exposure, and hence, likelihood of involvement in a collision. Motor vehicle registration data is somewhat less accurate as a normalizing factor, but is utilized since exposure information is not available. Rates based on registration data should be examined with caution, as the reliability of the registration information is unknown.

Population also provides a suitable and accurate normalizing factor. Exhibits 1-1, 1-2, 1-3 and associated analysis in this chapter refer to data which has been calculated on a population rate basis.

Collisions

The overall motor vehicle collision rate is shown in Exhibit 1-1. As of January 1, 1978, the reporting level for property damage only collisions was raised from $200.00 to $400.00. In 1985, the overall number of collisions was 1.6 percent higher than in 1984.

Due to changes in the reporting criteria and reporting area for the period for which historical data are available, trend analysis of the number of collisions would not be appropriate or meaningful.

Collisions (Cont'd)

Personal injury collisions (Exhibit 1-1) show a significant (at the 99 percent level) decline from 1965 to 1985.

The results of this regression analysis and others for data in this chapter are included in Appendix Exhibit A-7.

Injuries

The personal injury rate graph (Exhibit 1-2) parallels the closely related injury collision graph (Exhibit 1-1). From 1951 to 1963, a significant increase in the personal injury rate is noted, while from 1963 to 1985, a slight decrease (statistically significant at the 95 percent level) is shown.

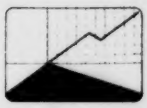
The rate of occurrence of pedestrian injuries (Exhibit 1-2) has demonstrated a modest but consistent decrease from 1951 to 1985.

Fatalities

In 1985, twenty-six persons died in motor vehicle collisions in Hamilton-Wentworth.

Since fatal collisions are rare events, small changes in the number of fatalities cause large fluctuations in the fatality rate (Exhibit 1-3). These fluctuations reduce the validity of statistical tests. Thus while the fatality rate for all collisions shows a slight downward trend, especially since 1968, this trend is not statistically significant. The overall fatality rate thus appears unchanged during the past 35 years. Comparable patterns are evident for Ontario and Canada (Appendix Exhibit A-5).

The fatality rate for pedestrians does display a reduction which is significant over the last 35 years.



Alcohol Involvement

When viewed as a proportion of overall collisions, statistics pertaining to alcohol involvement have remained quite constant over the period 1977 -1985. The percentage of collisions in which one or more drivers was reported to have consumed alcohol has averaged approximately 11 percent. Over 22 percent of fatal collisions over the nine year period involved a drinking driver. The proportion of all drivers who had been drinking or were impaired when involved in a collision has dropped from 8.3 percent in 1978 to 5.3 percent in 1985 (see Exhibit 3-6). In 1985, 16 - 20 year olds comprised 8.1 percent of the Hamilton-Wentworth population and were involved in approximately 13 percent of collisions after consuming alcohol.

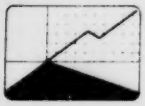


Exhibit 1-1

TRAFFIC COLLISION RATES 1951 TO DATE

PERSONAL INJURY COLLISION RATES 1954 TO DATE

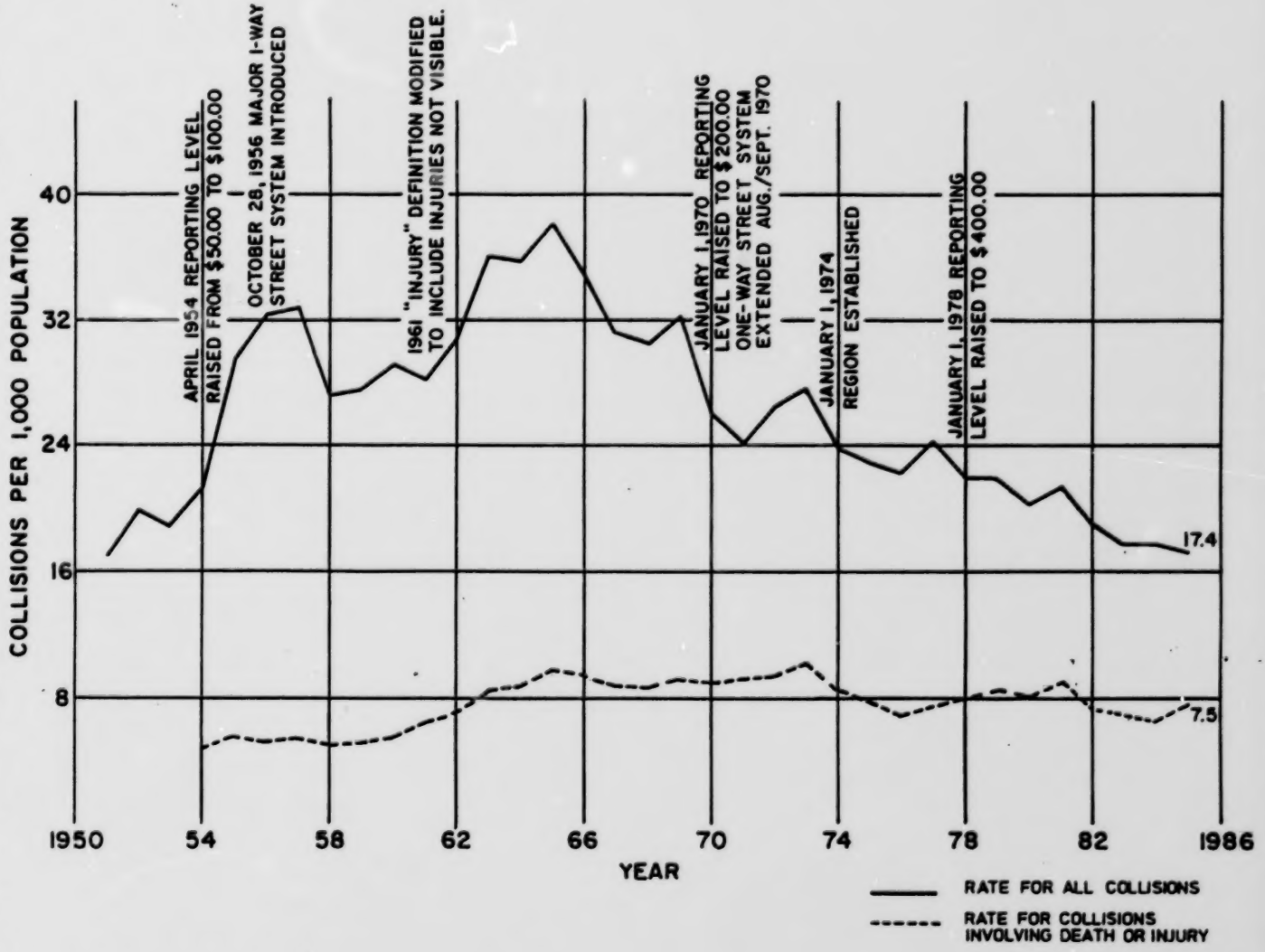


Exhibit 1-2

PERSONAL INJURY RATES 1951 TO DATE

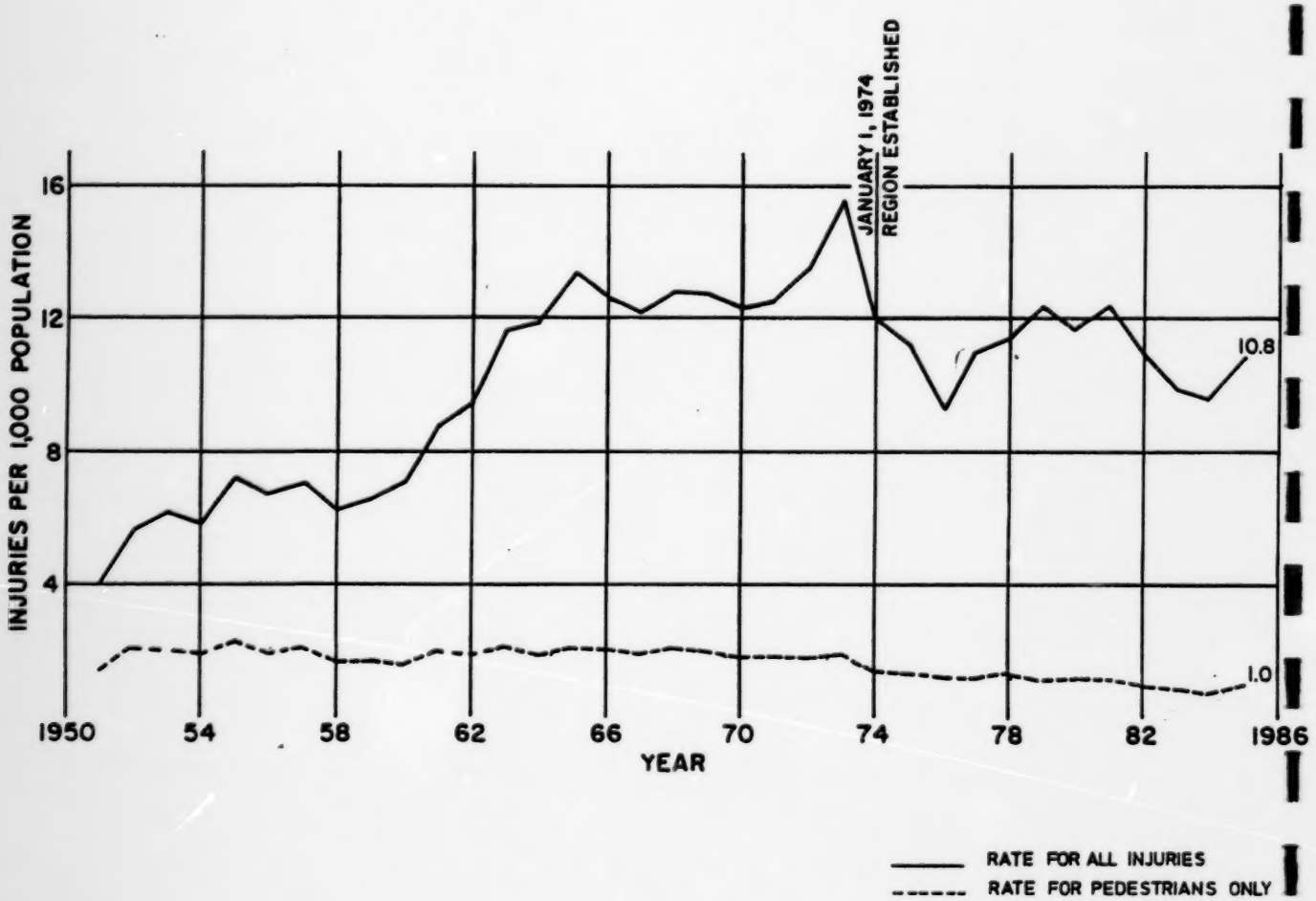


Exhibit 1-3

FATALITY RATES 1951 TO DATE

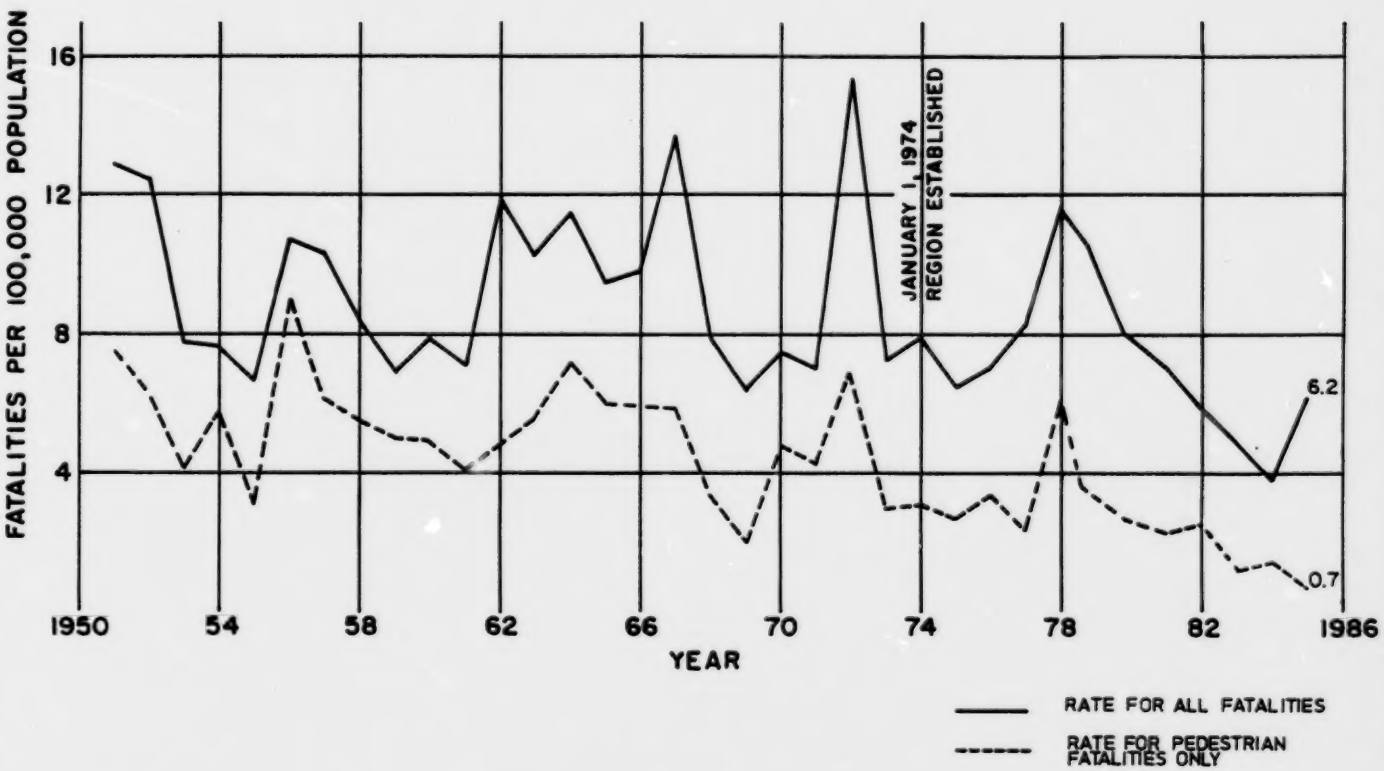


Exhibit 1-4

COLLISION STATISTICS - HISTORIC TRENDS

Year	Total No. of Collisions	Fatal Collisions	Injury Collisions	Property Damage Collisions	Estimated Total Property Damage ($)
1947	1,052	N/A	N/A	N/A	209,965
1948	1 351	N/A	N/A	N/A	312,170
1949	1,745	N/A	N/A	N/A	378,235
1950	2,304	N/A	N/A	N/A	522,535
1951	3,421	N/A	N/A	N/A	752,185
1952	4,219	N/A	N/A	N/A	892,329
1953	4,114	N/A	N/A	N/A	974,290
1954(a)	4,787	16	1,070	3,701	841,762
1955	6,691	13	1,297	5,381	1,014,339
1956	7,528	25	1,222	6,281	1,169,797
1957	7,973	25	1,376	6,572	1,382,399
1958	6,898	21	1,260	5,617	1,274,017
1959	7,189	18	1,337	5,834	1,388,015
1960	7,763	20	1,496	6,247	1,742,296
1961(a)	7,547	18	1,744	5,785	1,851,000
1962	8,338	28	1,904	6,406	2,160,000
1963	9,554	27	2,309	7,218	2,560,000

1964	9,948	32	2,455	7,461	2,886,000
1965	10,783	26	2,789	7,968	3,413,000
1966	9,950	27	2,757	7,166	3,521,000
1967	9,106	35	2,575	6,496	3,327,000
1968	8,983	21	2,547	6,415	4,449,000
1969	9,589	19	2,721	6,849	3,999,000
1970(a)	7,799	23	2,676	5,100	3,918,000
1971	7,314	22	2,821	4,471	4,647,000
1972	8,065	39	2,901	5,125	5,464,000
1973	8,499	23	3,143	5,333	6,208,000
1974(b)	9,599	29	3,364	6,206	7,886,000
1975	9,354	24	3,219	6,111	8,243,000
1976	9,146	28	2,816	6,302	9,262,000
1977	10,011	33	3,182	6,796	10,514,000
1978(a)	8,636	45	3,246	5,345	12,064,000
1979	8,798	39	3,389	5,370	13,325,000
1980	8,305	33	3,253	5,019	13,708,000
1981	8,660	28	3,398	5,234	15,536,040
1982	7,663	23	2,939	4,701	13,750,100
1983	7,268	20	2,839	4,409	13,924,500
1984	7,228	18	2,726	4,484	14,494,300
1985	7,346	21	3,153	4,172	17,394,079

(a) Collision reporting criteria changed (See Page 4).

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit 1-5

PERSONAL INJURIES AND FATALITIES - HISTORIC TRENDS

Year	Total No. of Collisions	Persons Injured	Injury Rate/ 1,000 Pop.	Persons Killed	Death Rate/ 100,000 Pop.	Death Rate/ 10,000 Registered Vehicles
1947	1,052	563	N/A	26	N/A	N/A
1948	1,351	671	N/A	19	N/A	5.34
1949	1,745	738	N/A	29	N/A	N/A
1950	2,304	760	N/A	12	N/A	2.55
1951	3,421	815	4.0	26	12.9	5.13
1952	4,219	1,174	5.6	26	12.4	4.71
1953	4,114	1,322	6.1	17	7.8	2.84
1954(a)	4,787	1,304	5.8	17	7.6	2.71
1955	6,691	1,618	7.2	15	6.6	2.22
1956	7,528	1,570	6.7	25	10.7	3.57
1957	7,978	1,703	7.0	25	10.3	3.46
1958	6,898	1,573	6.2	21	8.4	2.77
1959	7,189	1,671	6.5	18	6.9	2.24
1960	7,763	1,871	7.1	21	7.9	2.54
1961(a)	7,547	2,311	8.7	19	7.1	2.22
1962	8,338	2,542	9.5	32	11.9	3.82
1963	9,554	3,075	11.6	27	10.2	3.03

1964	9,948	3,305	11.9	32	11.5	3.43	
1965	10,783	3,824	13.4	27	9.5	2.64	
1966	9,950	3,746	12.6	28	9.8	2.60	
1967	9,106	3,484	12.2	39	13.7	3.63	
1968	8,983	3,573	12.8	22	7.9	1.89	
1969	9,589	3,768	12.7	19	6.4	1.64	
1970(a)	6,759	3,717	12.3	23	7.5	2.00	
1971	7,314	3,876	12.5	23	7.0	1.91	
1972	8,065	4,055	13.5	46	15.3	3.42	(b)
1973	8,499	4,951	15.5	23	7.2	1.63	
1974(c)	9,599	4,678	11.9	31	7.9	2.00	(b)
1975	9,354	4,474	11.2	26	6.5	1.60	(b)
1976	9,146	3,811	9.3	29	7.1	1.78	(b)
1977	10,011	4,513	11.0	34	8.3	2.00	(b)
1978(a)	8,636	4,635	11.4	47	11.6	2.06	(d)
1979	8,798	4,923	12.1	42	10.3	2.20	(d)
1980	8,305	4,800	11.7	33	8.0	1.43	(d)
1981	8,660	5,015	12.3	31	7.6	1.16	(d)
1982	7,663	4,175	10.3	27	6.6	0.91	
1983	7,268	4,041	9.9	20	4.9	N/A	
1984	7,228	3,855	9.5	18	3.8	0.79	(e)
1985	7,346	4,529	10.8	26	6.2	N/A	

(a) Collision reporting criteria changed (See Page 4).

(b) Registration estimated from total Ontario registrations.

(c) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

(d) Registration data from licence information.

(e) Registration data from licence information for Wentworth County.

Exhibit 1-6

COLLISIONS WITH ALCOHOL INVOLVEMENT
HISTORIC TRENDS

Year	Total Number of Reported Collisions	Alcohol-Related Motor Vehicle Collisions(a) Number	%	Total Number of Fatal Collisions	Total Number of Fatalities	Number of Alcohol-Related Motor Vehicle Fatal Collisions(a)
1977	10,011	1,175	11.7	33	34	5
1978	8,636	1,128	13.1	45	47	11
1979	8,798	1,139	12.9	39	42	5
1980	8,305	929	11.2	33	33	11
1981	8,660	1,053	12.2	28	31	8
1982	7,663	895	11.7	23	27	3
1983	7,268	765	10.5	20	20	5
1984	7,228	729	10.1	18	18	5
1985	7,346	644	8.8	21	26	5
TOTAL 1977-1985	73,915	8,457	11.4	260	278	58

(a) Includes drivers classified as impaired due to alcohol or classified as had been drinking.

(b) Sections of Canadian Criminal Code relating to impaired driving, the failure to provide breath sample, and driving with more than 80 mg. of alcohol in blood.

Number of Drivers Impaired or Had Been Drinking	Number of Drivers Under 21 Years of Age Impaired or Had Been Drinking Number	%	Number of Accidents with Charges Under Sections 234, 235, 236, 237 C.C.(b)	Number of Accidents with Drivers Under 21 Charged Under Sections 234-237 C.C. Number	%	Year
1,179	241	20.4	364	54	14.8	1977
1,169	258	22.1	379	53	14.0	1978
1,194	264	22.1	382	59	15.4	1979
953	178	18.7	303	56	18.5	1980
1,269	208	16.4	369	49	13.3	1981
918	174	19.0	319	49	15.4	1982
775	144	18.6	241	35	14.5	1983
741	111	15.0	308	29	9.4	1984
663	84	12.7	289	23	8.3	1985
8,831	1,662	18.8	2,954	407	13.8	TOTAL 1977 1985

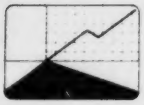
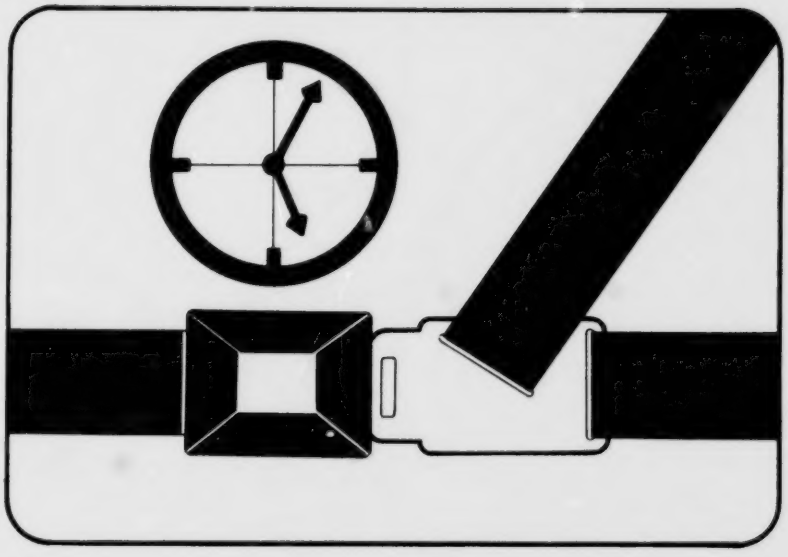


Exhibit 1-7

PEDESTRIAN AND CYCLIST INJURIES
HISTORIC TRENDS

YEAR	PEDESTRIAN		BICYCLIST	
	Injuries	Fatalities	Injuries	Fatalities
1947	141	21	N/A	N/A
1948	204	13	N/A	N/A
1949	271	18	43	-
1950	239	11	69	1
1951	284	15	89	-
1952	448	13	116	1
1953	464	9	113	1
1954	439	13	129	1
1955	517	7	141	1
1956	447	21	123	1
1957	526	15	124	2
1958	446	14	100	2
1959	456	13	120	1
1960	422	13	120	2
1961	522	11	112	1
1962	495	13	126	1
1963	558	15	120	1
1964	526	20	120	-
1965	582	17	140	-
1966	618	17	132	1
1967	537	17	113	-
1968	588	10	84	1
1969	602	6	91	2
1970	586	14	101	1
1971	570	13	155	2
1972	530	21	156	2
1973	569	9	197	1
1974(a)	555	13	192	3
1975	513	11	235	-
1976	480	14	195	-
1977	503	10	193	3
1978	542	25	162	1
1979	464	15	177	4
1980	434	12	178	1
1981	458	10	159	1
1982	396	10	252	2
1983	387	5	200	2
1984	314	6	175	1
1985	405	3	239	2

(a) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.



Chapter Two
Selected
Caracteristics

Injuries

Of the 21,405 persons involved in collisions, 4,529 received injuries. The chance of an involved person sustaining an injury in a collision varied from a 18 percent chance for a motor vehicle rider or passenger to a 100 percent chance for a pedestrian (Exhibit 2-1). Although the risk of injury would appear to be significantly higher for motorcyclists, bicyclists and pedestrians, this phenomenum is partially or wholly explained by the reporting criteria. It is unlikely that a cyclist or pedestrian would be involved in a collision that resulted in over $400.00 damage without the cyclist or pedestrian being injured. Small or exposed vehicles such as bicycles also afford less protection in a collision.

Seatbelts

Although motor vehicle seatbelts were reported as being in use for 92 percent of involved drivers (Exhibit 2-2), field observations taken by the Province of Ontario in 1978 (2.1) suggest an actual usage rate for drivers in the order of 65 percent. This discrepancy could be interpreted to mean that a higher proportion of seatbelt users were involved in collisions, but is more likely to indicate an over-statement of seatbelt usage by persons involved in collisions. The involved individual may be concerned about receiving a summons for failure to wear his or her seatbelt or may be concerned about additional financial or civil responsibilities caused by failure to wear belts at the time of the collision.

Motorcycle Injuries

Eighty-seven percent of motorcyclists involved in collisions received injuries, compared to 21 percent of all persons involved in collisions. This is indicative of the limited protection afforded to motorcycle riders involved in a collision.

Fifty-one of 259 (20%) motorcyclists involved in collisions were reported as not wearing helmets, despite the Provincial law mandating helmet use (Exhibit 2-3).

Motorcycle Injuries (Cont'd)

Helmet use did not appear to have an effect on the likelihood of a motorcyclist being injured in a collision. Helmets are intended to prevent head injury, but in a serious collision, the motorcycle rider is equally likely to receive injuries to other parts of the body.

Damages

Total damages in collisions in Hamilton-Wentworth amounted to a sum of approximately 17.4 million dollars (Exhibit 2-4), which includes damage to vehicles and property but does not include medical and hospital expenses, loss of income, or loss of future earnings. The estimated cost of property damage of each collision was $2,368 with 63 percent of the vehicles involved sustaining damage in excess of $600 (Exhibit 2-5). When the costs of medical attention, lost income and other effects are considered, the total cost of each collision may exceed $6,268 (2.3).

Times of Occurrence

A close similarity between the occurrence of collisions and traffic volumes, on a time of day basis (Exhibit 2-6), was observed. However, the collision rate (in terms of traffic volume) was greater than the daily average during the period from midnight to 5 a.m., when 633 or 8.7 percent of all collisions occurred.

The pattern of collision occurrences by time of day and day of week was summarized (Exhibit 2-7 and Exhibit 2-8), and distinct differences were found in the pattern of collision occurrence.

The explanation for variations in patterns of collisions by time of day and day of week may be associated with difference in travel patterns which change during the week due to the frequency of shopping or personal trips, or with psychological factors such as different drinking and stress patterns that might influence collision involvement.

Times of Occurrence (Cont'd)

The pattern of collision occurrences was compared on a month of year basis (Exhibit 2-9) and there was a difference between the number of collisions which occurred each month. The higher number of collisions occurring during the winter months is probably primarily due to drivers not adjusting to adverse weather and roadway conditions.

Impact Types

The type of initial impact was compared with the injury classification of the collisions (Exhibit 2-10) and it was determined (at the 95 percent level) that the probability of injury was not the same for all initial impact types.

The chance of being injured in a single motor vehicle or approaching vehicle collision was 51 to 56 percent compared to a 24 to 53 percent chance for other collision types. However, fewer approaching and single motor vehicle collisions resulted in injuries or fatalities (772 versus 2,402) than other collision types.

Greater than one half of all collisions were in intersections or associated with intersections (Exhibit 2-11). Twenty-seven percent of collisions occurred at signalized intersections, and 24 percent at stop- or yield-controlled intersections (Exhibit 2-12).

Forty-eight percent of all collisions occurred at locations with no form of traffic control.

REFERENCES

2.1 Based on surveys conducted by the Ministry of Transportation and Communications of Ontario, July 1978.

2.2 Ontario Ministry of Health: The cost of hospital and medical treatment for a person injured while wearing seatbelts is $282; for those not wearing belts, $419.

2.3 J. J. Lawson, in "The Cost of Road Accidents and Their Application in Economic Evaluation of Safety Programs" estimated that, in 1978, the average cost of a motor vehicle collision was $4,500.00 for the direct costs of property damage, lost productive work and health care costs only. The 1978 cost was adjusted to $3,593.00 to more accurately reflect the severity and type of collisions which occur in Hamilton-Wentworth. Based on the Consumer Price Index, the comparable value for 1985 is $6,268.00 per collision.

Exhibit 2-1

INJURY STATUS OF ALL PERSONS INVOLVED

Category	Persons Involved	Persons Injured or Killed	Injuries/ Involved	TYPE OF INJURY Fatal	Major*	Minor*	Minimal*
Driver	12,769	2,463	0.19	13	101	814	1,535
Bicyclist	243	239	0.98	2	17	99	121
Rider/Passenger	7,983	1,417	0.18	8	65	458	886
Pedestrian	410	410	1.00	3	65	205	137
Totals	21,405	4,529	0.21	26	248	1,576	2,679

THERE WAS APPROXIMATELY A 2 IN 10 CHANCE THAT A PERSON INVOLVED IN A TRAFFIC COLLISION WOULD BE INJURED.

FOR EVERY 20 RESIDENTS OF THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH, APPROXIMATELY 1 PERSON WAS INVOLVED IN A MOTOR VEHICLE COLLISION IN 1985.

* TYPE OF INJURY DESCRIPTION

MINIMAL: PERSON DID NOT GO TO A HOSPITAL FOR MEDICAL TREATMENT UPON LEAVING THE SCENE OF THE ACCIDENT.

MINOR: PERSON DID GO TO HOSIPITAL FOR MEDICAL TREATMENT BUT WAS RELEASED WITHOUT BEING ADMITTED.

MAJOR: PERSON ADMITTED TO HOSPITAL FOR TREATMENT OF INJURIES RECEIVED IN THE ACCIDENT.

Exhibit 2-2

DRIVER INJURY STATUS VS SAFETY EQUIPMENT IN USE

Driver Injury Status	SAFETY EQUIPMENT IN USE: All	Pelvic Only	None	Unknown	Total
None	9,625	75	261	352	10,313
Minimal	1,399	7	73	55	1,534
Minor	686	7	75	47	815
Major	69	2	15	15	101
Fatal	7	-	2	4	13
Total	11,786	91	426	473	12,776

DRIVERS WHOSE SEAT BELT USAGE WAS RECORDED	12,776
TOTAL DRIVERS WEARING PELVIC AND/OR SHOULDER BELTS	11,877
RECORDED DRIVER BELT USAGE	93.0%

THE REPORTED SEAT BELT USAGE RATE FOR DRIVERS INVOLVED IN COLLISIONS WAS 93%.

Exhibit 2-3

MOTORCYCLE DRIVER INJURIES

Helmet in Use?

Injury	Yes	No	Not Known	Total
None	22	10	2	34
Minimal	54	17	3	74
Minor	89	18	2	109
Major	25	5	1	31
Fatal	3	1	-	4
Unknown	-	-	7	7
Totals	193	51	15	259

87% OF MOTORCYCLE DRIVERS INVOLVED IN COLLISIONS FOR WHICH INJURY STATUS WAS RECORDED RECEIVED INJURIES. THE LIKELIHOOD OF INJURY WAS SIMILAR FOR HELMET USERS AND NON USERS (HELMETS OFFER PROTECTION ONLY FOR HEAD AND NECK INJURIES).

20% OF MOTORCYCLISTS INVOLVED IN COLLISIONS WERE RECORDED AS NOT WEARING SAFETY HELMETS.

Exhibit 2-4

PROPERTY DAMAGE ESTIMATES (a)

	Total	Average per Collision
Damage to Vehicles	$16,797,224.	$2,287.
Damage to Other Property	596,855.	81.
All Damage	17,394,079.	2,368.

THE AVERAGE DAMAGE FOR EACH REPORTED COLLISION WAS $2,368.

Exhibit 2-5

ESTIMATED DAMAGE TO MOTOR VEHICLES (a)

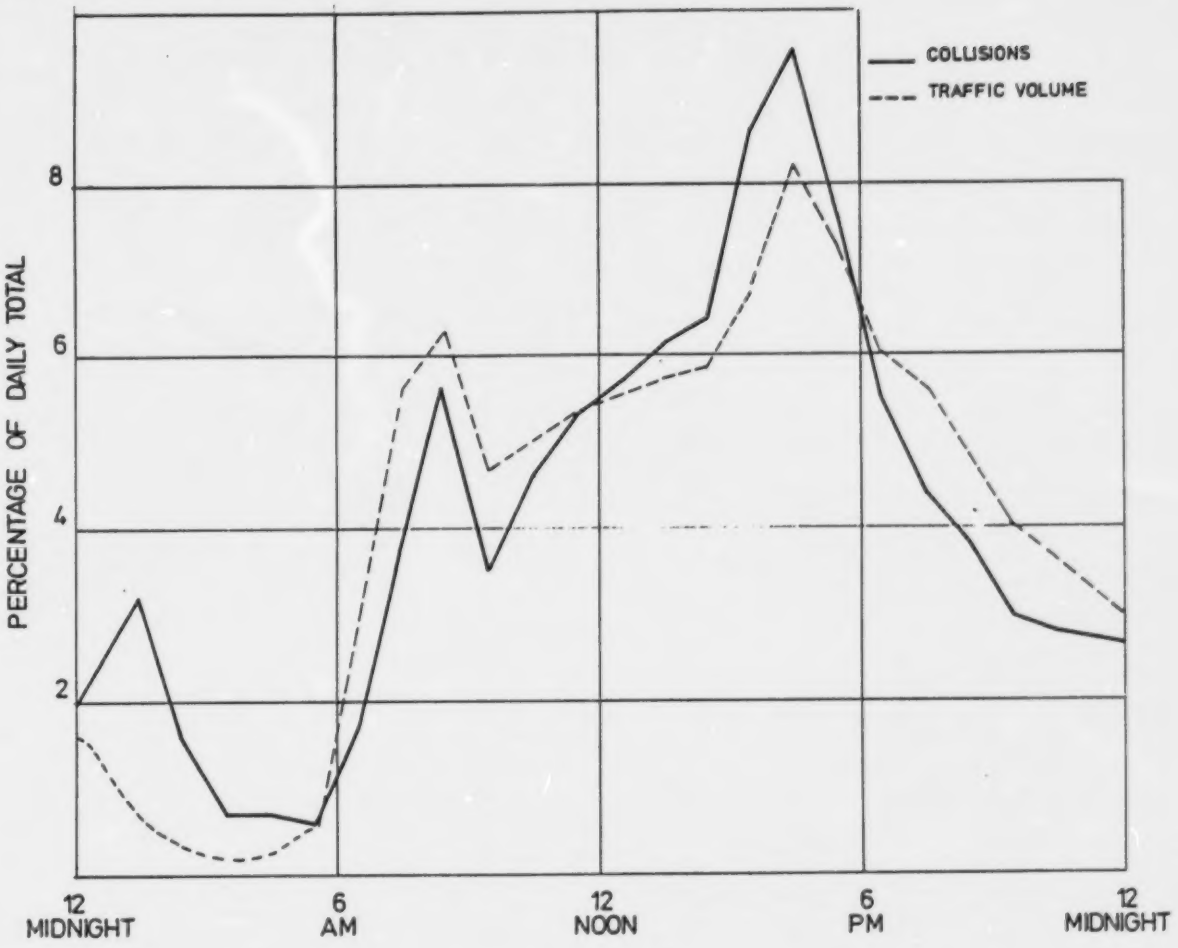
Damage	No. of Vehicles	% Of All Vehicles Involved
None	726	9.9
$0 - 199	560	7.6
$200 - 399	632	8.6
$400 - 599	772	10.5
$600 - 999	1,224	16.7
$1,000 - 1,999	1,778	24.2
$2,000 - 3,999	1,236	16.8
$4,000 and over	418	5.7
	7,346	100.0

OVER 47% OF THE VEHICLES INVOLVED IN COLLISIONS EXPERIENCED DAMAGE IN EXCESS OF $1,000., AS ESTIMATED AT THE SCENE OF THE COLLISION.

(a) As estimated at the scene of the collision.

TIME OF DAY VS TRAFFIC VOLUME

Exhibit 2-6



TIME OF DAY VS COLLISION RATE

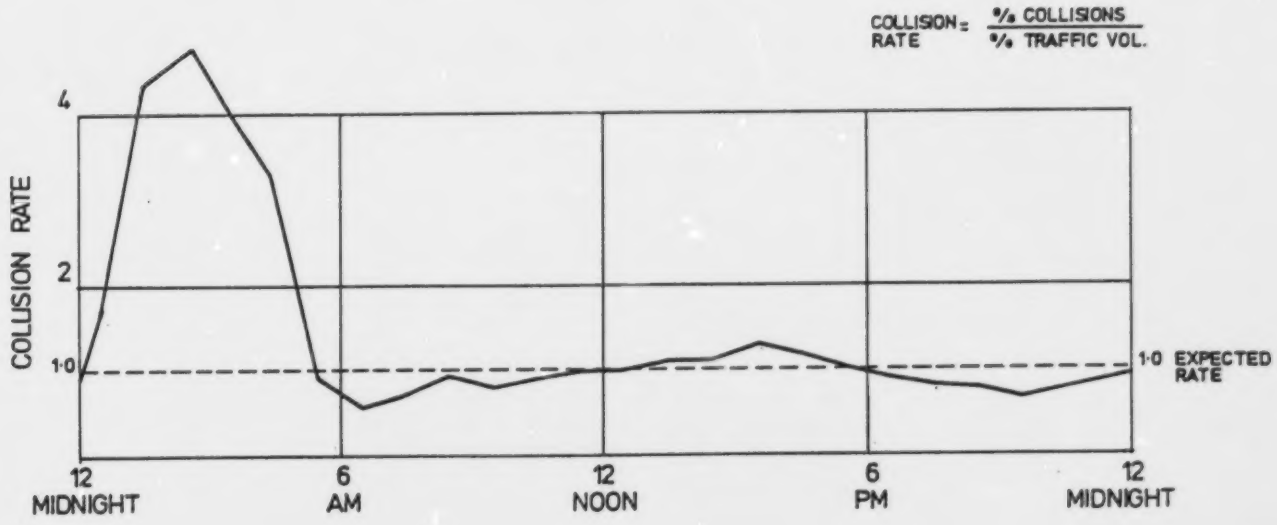


Exhibit 2-7

COLLISION OCCURRENCES BY TIME OF DAY AND DAY OF WEEK

Time	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTALS	%
12 - 1 a.m.	14	15	24	18	25	35	42	173	2.4
1 - 2 a.m.	8	20	19	34	37	58	57	233	3.2
2 - 3 a.m.	5	8	10	7	19	35	32	116	1.6
3 - 4 a.m.	5	6	4	9	6	18	14	62	0.8
4 - 5 a.m.	6	5	6	7	6	10	9	49	0.7
5 - 6 a.m.	6	6	5	5	7	7	8	44	0.6
6 - 7 a.m.	30	28	17	17	26	17	6	141	1.9
7 - 8 a.m.	42	46	57	65	46	11	6	273	3.7
8 - 9 a.m.	73	76	63	82	78	21	16	409	5.6
9 - 10 a.m.	38	43	38	43	38	37	22	259	3.5
10 - 11 a.m.	47	60	43	49	59	51	27	336	4.6
11 - 12 noon	57	53	46	69	72	66	27	390	5.3
12 - 1 p.m.	65	57	48	61	57	89	45	422	5.7
1 - 2 p.m.	58	62	60	87	71	67	45	450	6.1
2 - 3 p.m.	59	53	59	80	82	83	52	468	6.4
3 - 4 p.m.	82	91	95	99	129	93	45	634	8.6
4 - 5 p.m.	111	133	82	116	129	73	51	695	9.5
5 - 6 p.m.	79	90	70	101	106	75	35	556	7.6
6 - 7 p.m.	54	70	63	49	65	57	43	401	5.5
7 - 8 p.m.	34	39	31	57	77	51	35	324	4.4
8 - 9 p.m.	30	29	33	45	66	42	34	279	3.8
9 - 10 p.m.	26	28	32	39	41	29	27	222	3.0
10 - 11 p.m.	23	27	29	22	40	35	32	208	2.8
11 - 12 a.m.	31	23	18	24	43	33	30	202	2.7
Totals	983	1,068	952	1,185	1,325	1,093	740	7,346	100.0
%	13.4	14.5	13.0	16.1	18.0	14.9	10.1		

THE HIGHEST COLLISION PERIODS WERE TUESDAY BETWEEEN 4 P.M. AND 5 P.M., FOLLOWED BY FRIDAY BETWEEN 3:00 P.M., AND 5:00 P.M.

Exhibit 2-8

DAY OF WEEK VS COLLISIONS AND VOLUME

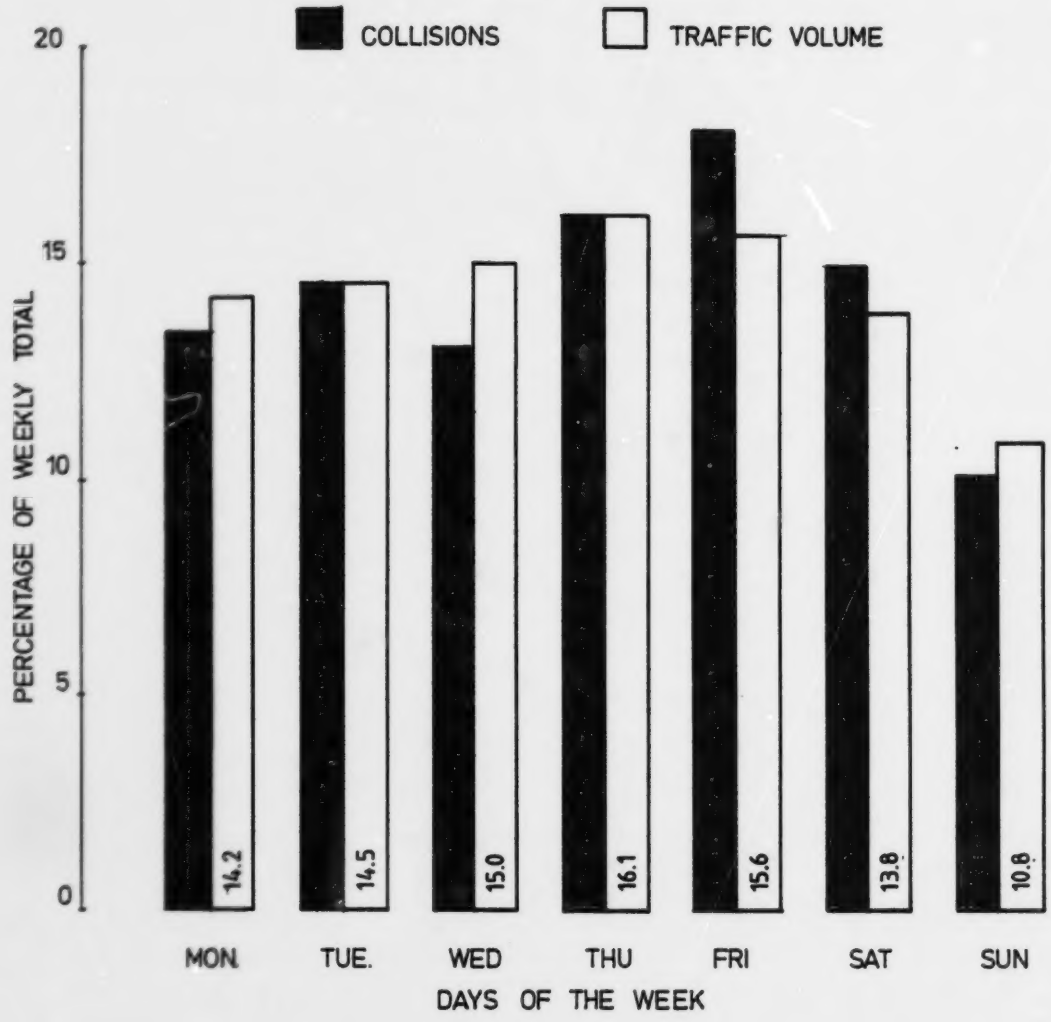


Exhibit 2-9

MONTH OF YEAR OF OCCURRENCE OF COLLISIONS

Month	Number of Collisions	Percentage of Total Collisions
January	658	8.9
February	651	8.9
March	505	6.9
April	507	6.9
May	607	8.3
June	614	8.3
July	522	7.1
August	543	7.4
September	549	7.5
October	687	9.3
November	764	10.4
December	739	10.1
	7,346	100.0

THE HIGHEST NUMBER OF COLLISIONS OCCURRED IN THE MONTH OF NOVEMBER.

Exhibit 2-10

INITIAL IMPACT TYPE VS CLASSIFICATION

Initial Type	A Fatal Injury No.	%	B Non-Fatal Injury No.	%	C Property Damage Only No.	%	D All Collisions No.	%	% of Type Involving Injury
Rear End	1	(4.8)	931	(29.5)	811	(19.4)	1,743	(23.7)	53.0
Angle	7	(33.3)	885	(28.1)	1,404	(33.7)	2,296	(31.3)	39.0
Turning	1	(4.8)	350	(11.1)	637	(15.3)	988	(13.4)	36.0
Sideswipe	2	(9.5)	178	(5.6)	582	(13.9)	762	(10.4)	24.0
Approaching	3	(14.3)	320	(10.2)	255	(6.1)	578	(7.9)	56.0
Single Motor Vehicle	7	(33.3)	442	(14.0)	439	(10.5)	888	(12.1)	51.0
Other	-	(-)	47	(1.5)	44	(1.1)	91	(1.2)	52.0
	21	(100.0)	3,153	(100.0)	4,172	(100.0)	7,346	(100.0)	

55% OF THE INITIAL IMPACTS RECORDED WERE "ANGLE" AND "REAR END".

THE PROBABILITY OF FATALITY OR INJURY WAS HIGHEST IN REAR END OR APPROACHING COLLISIONS.

SELECTED CHARACTERISTICS

Exhibit 2-11

INITIAL IMPACT TYPE VERSUS ROAD LOCATION

Impact Type	Road Location								
	Non-Intersection	Intersection Related	In Intersection	At Private Drive	At Railroad	Underpass or Tunnel	Overpass or Bridge	Other	Totals
Rear End	773	532	251	163	9	1	6	8	1,743
Angle	443	298	1,208	325	4	1	8	9	2,296
Turning	103	179	518	184	-	1	2	1	988
Sideswipe	454	132	113	57	1	-	3	2	762
Approaching	258	83	183	42	1	1	5	5	578
Single Motor Vehicle	548	158	97	50	4	6	17	8	888
Other	55	11	16	8	1	-	-	-	91
TOTALS	2,634	1,393	2,386	829	20	10	41	33	7,346
%	(35.8)	(19.0)	(32.5)	(11.3)	(0.3)	(0.1)	(0.6)	(0.4)	(100.0)

52% OF COLLISIONS WERE IN, OR ASSOCIATED WITH INTERSECTIONS.

Exhibit 2-12

INITIAL IMPACT TYPE VERSUS TYPE OF TRAFFIC CONTROL

	Type of Traffic Control										
	Operating			Non-Operating							
Impact Type	Traffic Signal	Stop Sign	Yield Sign	Traffic Signal	Stop Sign	Police Control	School Guard	School Bus	No Control	Other	Totals
Rear End	518	197	27	3	1	6	3	2	972	14	1,743
Angle	644	814	18	4	8	1	3	-	795	9	2,296
Turning	419	233	5	1	2	-	-	-	325	3	988
Sideswipe	161	113	4	2	-	2	-	-	476	4	762
Approaching	114	151	5	5	3	-	-	-	293	7	578
Single Motor Vehicle	127	136	2	3	2	-	1	-	609	8	888
Other	15	16	1	1	-	-	-	-	58	-	91
TOTALS	1,998	1,660	62	19	16	9	7	2	3,528	45	7,346
%	27.2	22.6	0.9	0.3	0.2	0.1	0.1	0.0	48.0	0.6	100.0

48% OF ALL COLLISIONS OCCURRED AT LOCATIONS WITH NO TRAFFIC CONTROL.

SELECTED CHARACTERISTICS

Chapter Three
Drivers

Driver Age

Although sixteen to nineteen year olds make up only 5.5 percent of the licenced driving population, this age group was involved in 9.4 percent of reported collisions (Exhibit 3-1). The highest rate of any age group.

Drivers under 21 years of age involved in a collision were recorded as driving properly less than 50 percent of the time. The most frequent improper driving actions recorded for this group were, "failing to yield the right-of-way", "following too close", and "loss of control". (Exhibit 3-2).

Drivers over the age of 65 involved in a collision were recorded as driving properly less than 40 percent of the time. The most frequent improper driving actions recorded for this group were, "failing to yield the right-of-way", "improper turn" and "following too close". (Exhibit 3-2).

Drinking Drivers

Drinking drivers were involved in 8.8 percent of all reported collisions, 23.8 percent of fatal collisions and 11.3 percent of injury collisions (Exhibit 3-3). There was a 33 percent greater chance of an injury occurring in a collision which involved a driver who had been drinking than in a collision in which all drivers were sober. Drivers reported as impaired had relatively constant probability of involvement in injury-causing or property damage only collisions.

Exhibit 3-4 indicates that 41.6 percent of the collisions which occurred during the period from 10 p.m. to 3 a.m. from Wednesdays to Sundays involved drinking drivers.

Exhibit 3-5 indicates that less than 14 percent of the drivers involved in collisions who had been drinking or were impaired were driving properly at the time of the collision and the most frequently indicated improper driver action was loss of control of the vehicle.

Sixteen to nineteen year-olds had the highest probability of being under the influence of alcohol at the time of a collision. Twenty to twenty-four year-olds had the next highest likelihood of being under the influence of alcohol at the time of a collision. (Exhibit 3-6).

Hit and Run Collisions

In 1985, there were 765 hit and run collisions involving 765 hit and run drivers. One hundred percent of hit and run drivers involved in fatal collisions were subsequently apprehended. Forty-one percent of hit and run drivers involved in injury collisions were subsequently apprehended. Seventeen percent of hit and run drivers involved in property damage collisions were subsequently apprehended. (Exhibit 3-8).

Non-Licenced Drivers

The non-licenced driver, including those whose licence was under suspension, was more likely to be involved in a fatal collision (Exhibit 3-9) and also more likely to be under the influence of alcohol at the time of the collision (Exhibit 3-10). The non-licenced driver was also less likely to have been driving properly at the time of the collision (Exhibit 3-11). The most frequent improper driving action of non-licenced drivers involved in a collision was loss of control.

Exhibit 3-12 indicates that 49 percent of the collisions involving a non-licenced driver occurred between 6 p.m. and 6 a.m. whereas only 32 percent of all collisions occurred during this period. The exhibit also indicates that 77 percent of the alcohol-related collisions occurred during this period. The 6 p.m. to 6 a.m. period is characterized by high alcohol involvement, high involvement of non-licenced drivers and high collision involvement rate.

Moving Violations

The Regional Police Department issued over 56,000 moving violation summonses in 1985 and this effort at reducing traffic collisions by selective enforcement is recognized. However, it was determined that, in many cases, enforcement was directed at violations that do not relate proportionately to violations indicated in traffic collisions. This could indicate that the enforcement effort is very successful in that it eliminates collisions of related types. However, this may be an indication that a portion of the enforcement effort is directed at moving violations that are readily enforceable (Exhibit 3-13). It is recognized that some violations involved in colli-

Moving Violations (Cont'd)

sions are difficult to enforce or represent an unfeasible countermeasure to collision occurrences. For example, "following too close" was indicated in 18.7 percent of the improper driving actions and "failure to yield the right-of-way" was indicated in 24.0 percent of improper driving actions. The former is difficult to enforce in the absence of a collision, and it is unfeasible to enforce the latter because proof of failure to yield the right-of-way is only possible in the event of a collision. Selective enforcement nonetheless is a recognized collision countermeasure technique for other types of moving violations.

Motorcycles

The proportion of motorcycle drivers involved in collisions recorded as driving properly is higher than the proportion for other motor vehicle drivers of similar age groups (Exhibit 3-14). This exhibit also indicates that the most frequent improper driver action for motorcyclists was "lost control".

Without more refined data on exposure of motorcyclists in traffic under non-collision circumstances, the significance of a higher proportion of involved motorcycle drivers driving properly in a collision cannot be specifically determined. It could be hypothesized that a motorcycle operator is particularly prone to being involved in a collision when driving properly or alternatively, that the motorcycle operator is particularly adept in avoiding a collision for which he or she would have been responsible.

Bicycles

It was determined that responsibility for a collision involving a bicyclist decreased with increased bicyclist age and that 11.4 percent or less of bicyclists under 15 involved in collisions were recorded as driving properly (Exhibit 3-15). The most predominant known cyclist improper action indicated was "failure to yield the right-of- way" but instances of disobeying other traffic laws were also prominent.

Exhibit 3-1

LICENCED MOTOR VEHICLE DRIVER AGE VS COLLISION INVOLVEMENT

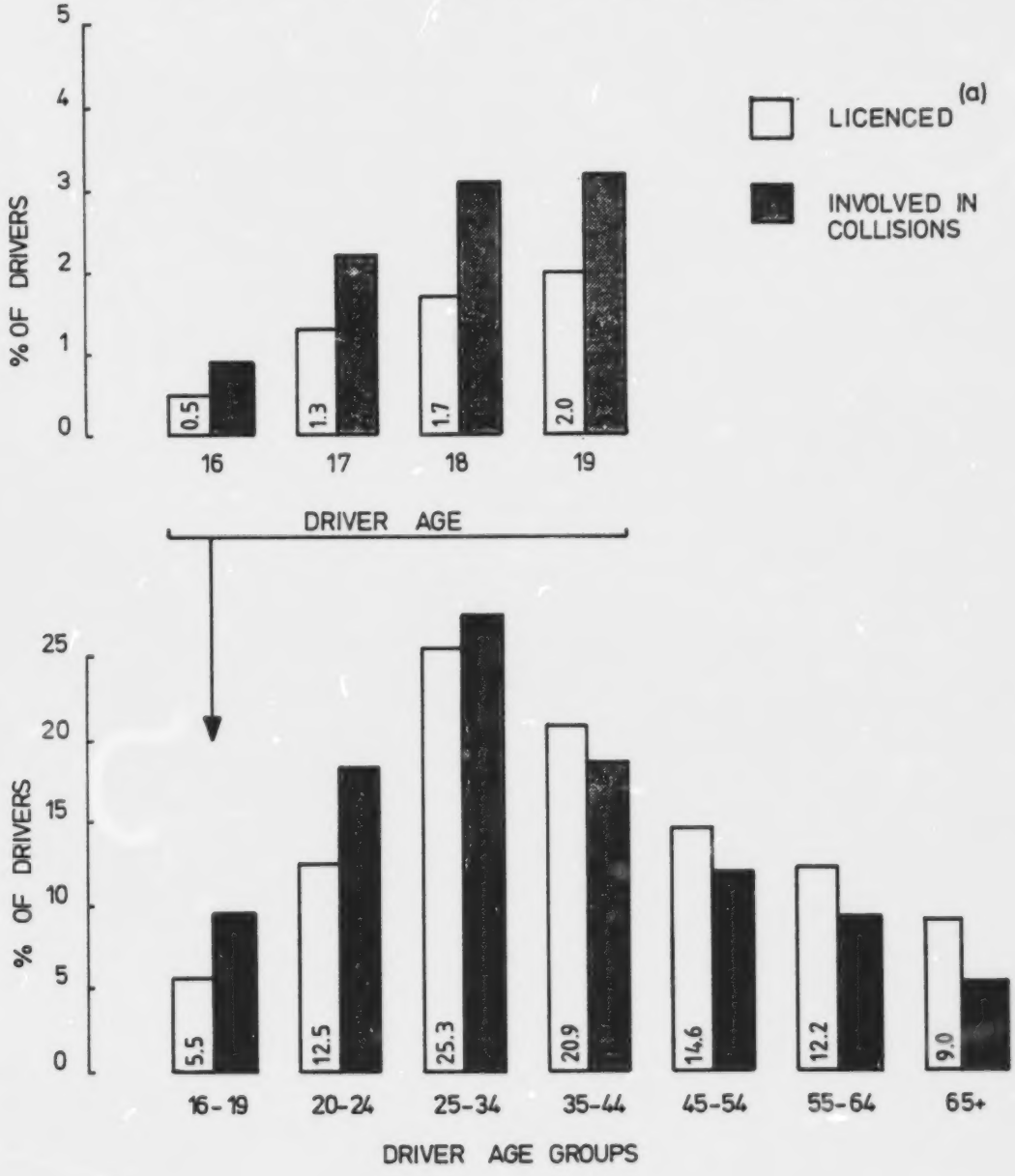


Exhibit 3-2

MOTOR VEHICLE DRIVER AGE VS DRIVER ACTION

Driver Action	0-4	5-9	10-14	15	16	17	18	19	20	21	22
Driving Properly	1	-	-	-	26	85	154	171	223	233	204
Following Too Close	-	-	-	-	14	34	46	44	50	52	44
Speed Too Fast	-	-	-	1	6	8	7	10	17	12	13
Improper Turn	-	-	-	-	12	19	20	17	29	28	20
Disobey Traffic Signal	-	-	-	-	3	5	7	11	12	17	14
Disobey Stop Sign	-	-	-	-	1	9	14	11	11	12	10
Fail to Yield R.O.W.	1	-	-	-	16	24	47	40	57	39	45
Improper Passing	-	-	-	-	-	5	9	2	4	7	3
Lost Control	-	-	-	1	18	40	49	56	42	42	38
Wrong Way One-Way Street	-	-	-	-	-	-	1	-	2	2	1
Not Known	-	-	-	2	9	17	17	17	14	25	16
Other	-	-	1	1	15	32	22	32	33	18	30
Disobey Other Control	-	-	-	-	-	2	-	1	3	3	1
Totals	2	-	1	5	120	280	393	412	497	490	439
% Drivers involved driving properly(a)	50.0	-	-	-	27.1	36.8	43.5	47.1	49.6	52.1	51.9

(a) Excluding "Not Known" and "Other".

23	24	25-34	35-44	45-54	55-64	65-74	75 +	Totals	%	Driver Action
217	231	1,875	1,302	782	621	171	48	6,344	(49.7)	Driving Properly
51	48	331	166	100	69	28	14	1,091	(8.6)	Following Too Close
11	11	49	23	18	7	1	2	196	(1.5)	Speed Too Fast
19	16	156	116	103	72	54	20	701	(5.5)	Improper Turn
7	11	85	48	49	30	25	11	335	(2.6)	Disobey Traffic Signal
5	12	55	33	27	19	15	2	236	(1.9)	Disobey Stop Sign
37	39	332	248	180	142	113	46	1,406	(11.0)	Fail To Yield R.O.W.
2	1	28	14	12	12	6	3	108	(0.8)	Improper Passing
44	42	193	133	80	56	17	9	860	(6.7)	Lost Control
-	-	7	2	2	3	-	-	20	(0.2)	Wrong Way One-Way Street Not Known
14	10	173	103	79	55	18	7	576	(4.5)	Known
38	33	210	145	95	84	34	12	835	(6.5)	Other
2	4	13	11	5	8	4	2	59	(0.5)	Disobey Other Control
447	458	3,507	2,344	1,532	1,178	486	176	12,767	(100.0)	**Totals**
54.9	55.7	60.0	62.1	57.6	59.7	39.4	30.6	55.9		% Drivers involved driving properly (a)

THE OVERALL PERCENTAGE OF DRIVERS DRIVING PROPERLY WAS 56%. THE THE PERCENTAGE OF DRIVERS DRIVING PROPERLY FOR DRIVER AGE GROUPS UNDER 21 AND OVER 64 WAS LESS THAN 50%.

THE MOST FREQUENT RECORDED IMPROPER DRIVING ACTION WAS FAILING TO YIELD RIGHT-OF-WAY.

Exhibit 3-3

ALCOHOL INVOLVEMENT VS COLLISION CLASSIFICATION

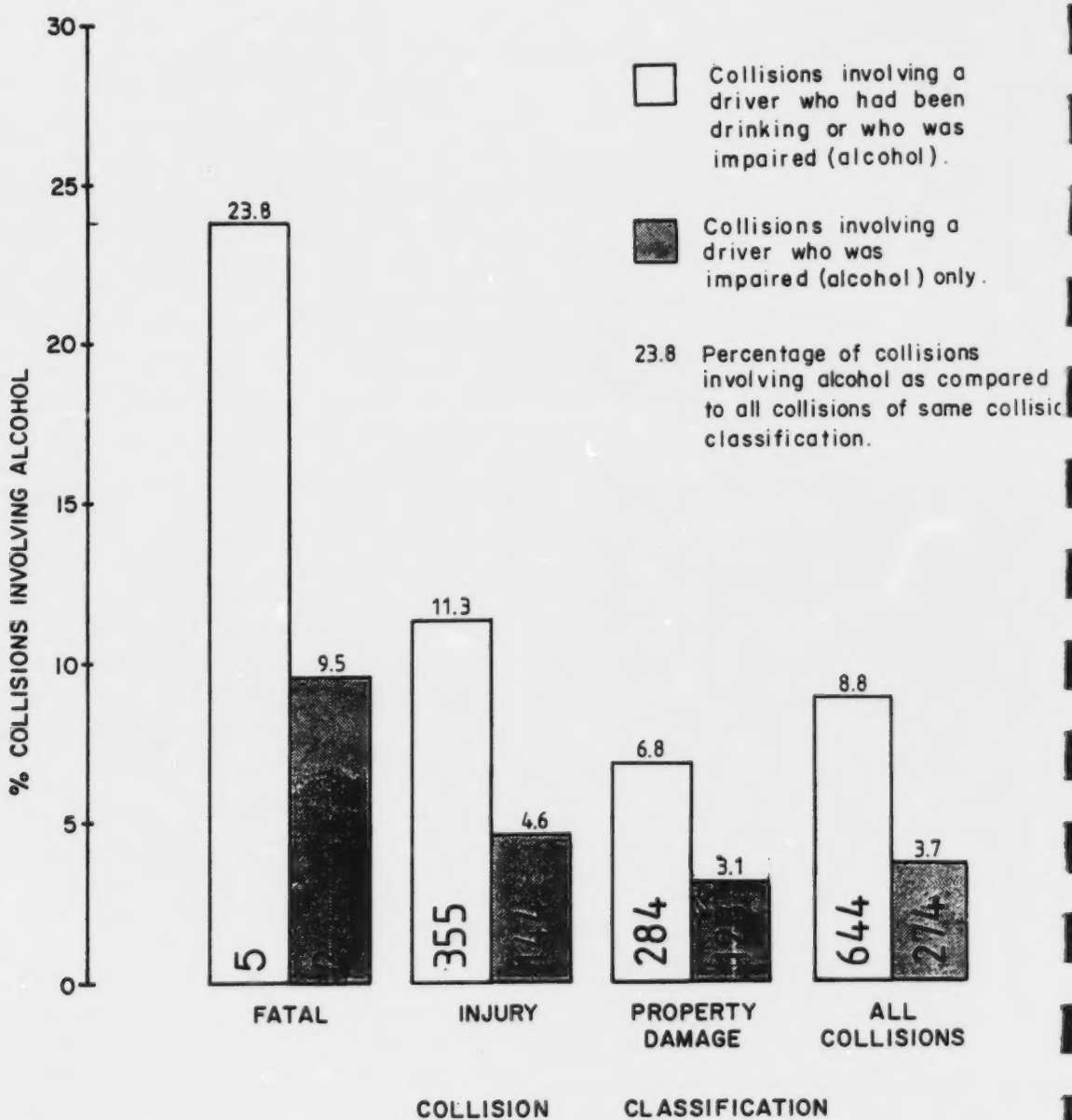


Exhibit 3-4

TIME OF DAY AND DAY OF WEEK OF COLLISIONS INVOLVING ALCOHOL

Time of Day	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL
12 - 1 a.m.	4	3	13	8	7	12	9	56
1 - 2 a.m.	3	9	4	16	17	30	27	106
2 - 3 a.m.	-	3	8	4	9	15	11	50
3 - 4 a.m.	-	1	1	4	2	5	9	22
4 - 5 a.m.	-	-	2	2	1	5	2	12
5 - 6 a.m.	-	-	1	-	1	2	3	7
6 - 7 a.m.	-	1	-	1	2	1	2	7
7 - 8 a.m.	-	-	-	-	1	-	-	1
8 - 9 a.m.	-	-	-	-	1	-	-	1
9 - 10 a.m.	-	1	-	-	-	1	-	2
10 - 11 a.m.	-	1	1	1	1	1	-	5
11 - 12 noon	1	-	-	-	1	-	-	2
12 - 1 p.m.	1	-	1	2	3	6	1	14
1 - 2 p.m.	1	3	2	-	1	1	1	9
2 - 3 p.m.	4	2	3	1	1	2	1	14
3 - 4 p.m.	-	1	3	4	4	6	4	22
4 - 5 p.m.	6	3	1	2	8	4	2	26
5 - 6 p.m.	4	11	6	5	4	10	4	44
6 - 7 p.m.	3	5	4	4	3	10	10	39
7 - 8 p.m.	1	3	4	5	7	4	2	26
8 - 9 p.m.	3	3	2	6	12	13	6	45
9 - 10 p.m.	4	2	-	5	14	8	4	37
10 - 11 p.m.	4	4	5	1	12	11	6	43
11 - 12 midnight	8	3	4	4	15	7	13	54
Totals	47	59	65	75	127	154	117	644

42% OF THE COLLISIONS WHICH OCCURRED DURING THE PERIOD FROM 10:00 P.M. TO 3:00 A.M., WEDNESDAYS TO SUNDAYS INVOLVED ALCOHOL.

9% OF ALL ALCOHOL RELATED COLLISIONS OCCURRED BETWEEN 1:00 A.M. AND 2:00 A.M. ON SATURDAYS AND SUNDAYS.

9% OF ALL COLLISIONS INVOLVED ONE OR MORE DRIVERS WHO HAD BEEN DRINKING.

Exhibit 3-5

DRIVER ACTION VS DRIVER CONDITION

	Normal	Had Been Drinking	Impaired-Alcohol	Impaired-Drugs	Fatigue
Driving Properly	6,218	55	9	-	1
Following Too Close	1,034	23	13	-	-
Speed Too Fast	136	35	15	2	-
Improper Turn	664	13	7	1	-
Disobey Traffic Signal	309	9	10	-	1
Disobey Stop Sign	214	9	8	-	-
Fail to Yield Right-of-Way	1,349	30	9	-	-
Improper Passing	88	6	7	-	-
Lost Control	584	111	95	4	7
Wrong Way on One-Way Street	12	1	3	-	-
Not Known	327	30	23	3	2
Other	663	56	68	2	5
Disobey Other Control	52	1	2	-	-
Totals	11,650	379	269	12	16
% Drivers involved driving properly(a)	58.3	18.8	5.1	-	11.1

(a) Excluding not known and other.

Medical Defect	Not Known	Other	Totals	(%)	
-	62	1	6,346	(49.7)	Driving Properly
1	20	-	1,091	(8.5)	Following Too Close
2	6	-	196	(1.5)	Speed Too Fast
1	14	2	702	(5.5)	Improper Turn
-	5	1	335	(2.6)	Disobey Traffic Signal
-	5	-	236	(1.9)	Disobey Stop Sign
2	15	1	1,406	(11.0)	Fail to Yield Right-of-Way
-	7	-	108	(0.9)	Improper Passing
7	52	-	860	(6.7)	Lost Control
-	4	-	20	(0.2)	Wrong Way on One-Way Street
-	190	1	576	(4.5)	Not Known
1	39	1	835	(6.5)	Other
-	4	-	59	(0.5)	Disobey Other Control
14	423	7	12,770	(100.0)	**Totals**
-	32.0	20.0	55.9		% Drivers involved driving properly(a)

LESS THAN 14% OF DRIVERS WHO HAD BEEN DRINKING OR WERE IMPAIRED WERE RECORDED AS DRIVING PROPERLY AT THE TIME OF THE COLLISION.

Exhibit 3-6

MOTOR VEHICLE DRIVER AGE VS DRIVER CONDITION

Driver Condition	0 - 4	5 - 9	10-14	15	16	17	18	19	20	21
Normal	2	-	1	3	113	252	359	367	458	439
Had Been Drinking	-	-	-	-	2	10	11	19	13	20
Impaired - Alcohol	-	-	-	-	-	2	7	11	8	11
Impaired - Drugs	-	-	-	-	1	1	-	-	1	-
Fatigue	-	-	-	-	-	-	2	1	-	1
Medical Defect	-	-	-	-	-	-	1	-	-	-
Not Known	-	-	-	2	4	15	13	14	17	19
Other	-	-	-	-	-	-	-	-	-	-
Totals	2	-	1	5	120	280	393	412	497	490
% Of All Drivers	-	-	-	-	0.5	1.3	1.7	2.0	2.5	2.6
% Drinking Drivers Involved(a)	-	-	-	-	1.7	4.5	4.7	7.5	4.4	6.6

(a) Excluding not known and other.

22-24	25-34	35-44	45-54	55-64	65-74	75 +	Total	%	Driver Condition
1,195	3,156	2,171	1,403	1,104	457	168	11,648	91.2	Normal
73	124	56	30	15	5	1	379	3.0	Had Been Drinking
31	91	41	40	22	3	2	269	2.1	Impaired-Alcohol
-	2	2	4	1	-	-	12	0.1	Impaired-Drugs
1	4	6	1	-	-	-	16	0.1	Fatigue
1	-	3	3	2	2	2	14	0.1	Medical Defect
45	128	64	49	32	18	2	422	3.3	Not Known
-	2	1	1	1	1	1	7	0.1	Other
1,346	3,507	2,344	1,531	1,177	486	176	12,767	100.0	Totals
7.4	25.3	21.0	14.6	12.2	8.4	0.6	-	-	% Of All Drivers
8.0	6.4	4.3	4.7	3.2	1.7	5.3			% Drinking Drivers Involved (a)

5% OF ALL DRIVERS INVOLVED HAD BEEN DRINKING OR WERE IMPAIRED BY ALCOHOL AT THE TIME OF THE COLLISION.

THE 17, 18, 19, 21, and 22-24, YEAR OLD AGE GROUPS HAD ABOVE AVERAGE LIKELIHOODS OF BEING UNDER THE INFLUENCE OF ALCOHOL AT THE TIME OF A COLLISION.

Exhibit 3-7

HIT AND RUN COLLISIONS

HIT AND RUN COLLISIONS	765	
HIT AND RUN DRIVERS	765	
DRIVERS APPREHENDED	194	(25.4%)

25% OF HIT AND RUN DRIVERS WERE SUBSEQUENTLY APPREHENDED.

Exhibit 3-8

HIT AND RUN COLLISION CLASSIFICATION

COLLISIONS IN WHICH:	FATAL	INJURY	PROPERTY DAMAGE	TOTAL
Driver(s) Apprehended	1	108	85	194
Driver(s) Not Apprehended	-	157	414	571
TOTAL	1 (0.1%)	265 (34.7%)	499 (65.2%)	765 (100.0%)

65% OF HIT AND RUN COLLISIONS INVOLVED PROPERTY DAMAGE ONLY.

Exhibit 3-9

LICENCE STATUS OF MOTOR VEHICLE DRIVERS VS CLASSIFICATION OF COLLISION

Classification	Non-Licenced No.	%	Licenced No.	%
Fatal	2	(1.0)	29	(0.2)
Injury	80	(38.3)	5,427	(43.2)
Property Damage	127	(60.7)	7,105	(56.6)
Total	209	(100.0)	12,561	(100.0)

A HIGHER PROBABILITY OF A FATAL COLLISION IS ASSOCIATED WITH THE INVOLVEMENT OF A NON-LICENCED DRIVER.

Exhibit 3-10

LICENCE STATUS OF MOTOR VEHICLE DRIVERS VS DRIVER CONDITION

Driver Condition	Non-Licenced No.	%	Licenced No.	%
Normal	124	(59.3)	11,526	(91.8)
Had Been Drinking	23	(11.0)	356	(2.8)
Impaired - Alcohol	19	(9.1)	250	(2.0)
Impaired - Drugs	4	(1.9)	8	(0.1)
Fatigue	2	(1.0)	14	(0.1)
Medical Defect	1	(0.5)	13	(0.1)
Not Known	35	(16.7)	388	(3.1)
Other	1	(0.5)	6	(0.0)
Total	209	(100.0)	12,561	(100.0)

A HIGHER PROBABILITY OF ALCOHOL USE WAS ASSOCIATED WITH THE INVOLVEMENT OF A NON-LICENCED DRIVER.

AN UNLICENCED DRIVER INVOLVED IN A COLLISION WAS OVER FIVE TIMES AS LIKELY TO HAVE BEEN UNDER THE INFLUENCE OF ALCOHOL OR DRUGS AS A LICENCED DRIVER.

Exhibit 3-11

LICENCE STATUS OF MOTOR VEHICLE DRIVER VS DRIVER ACTION

Driver Action	Non-Licenced No.	(% of Non-Licenced)	Licenced No.	(% of Licenced)
Driving Properly	40	(19.1)	6,306	(50.2)
Following Too Close	15	(7.2)	1,076	(8.6)
Speed Too Fast	8	(3.8)	188	(1.5)
Improper Turn	11	(5.3)	691	(5.5)
Disobey Traffic Signal	7	(3.3)	328	(2.6)
Disobey Stop Sign	7	(3.3)	229	(1.8)
Fail to Yield R.O.W.	16	(7.7)	1,390	(11.1)
Improper Passing	1	(0.5)	107	(0.9)
Lost Control	46	(22.0)	814	(6.5)
Wrong Way on One Way Street	2	(1.0)	18	(0.1)
Not Known	32	(15.3)	544	(4.3)
Other	22	(10.5)	813	(6.5)
Disobey Other Control	2	(1.0)	57	(0.4)
Total	209	(100.0)	12,561	(100.0)
% Drivers Driving Properly (a)		(25.8)		(56.3)

26% OF INVOLVED NON-LICENCED DRIVERS WERE DRIVING PROPERLY COMPARED WITH 56% OF LICENCED DRIVERS.

THE MOST FREQUENT RECORDED IMPROPER DRIVING ACTION FOR NON-LICENCED DRIVERS WERE "LOST CONTROL".

(a) Excluding "Not Known" and "Other".

Exhibit 3-12

TIME OF DAY VERSUS COLLISIONS FOR TOTAL COLLISIONS, COLLISIONS INVOLVING NON-LICENCED DRIVERS AND COLLISIONS INVOLVING ALCOHOL.

Time of Day	Collisions Involving Non-Licenced Drivers No.	(%)	% of Collisions Involving Alcohol	% of Total Collisions Occurring
12 - 1 a.m.	9	4.3	8.7	2.4
1 - 2 a.m.	15	7.2	16.5	3.2
2 - 3 a.m.	6	2.9	7.8	1.6
3 - 4 a.m.	5	2.4	3.4	0.8
4 - 5 a.m.	3	1.4	1.9	0.7
5 - 6 a.m.	1	0.5	1.1	0.6
6 - 7 a.m.	1	0.5	1.1	1.9
7 - 8 a.m.	4	1.9	0.1	3.7
8 - 9 a.m.	5	2.4	0.1	5.6
9 - 10 a.m.	3	1.4	0.3	3.5
10 - 11 a.m.	9	4.3	0.8	4.6
11 - 12 noon	8	3.8	0.3	5.3
12 - 1 p.m.	10	4.8	2.2	5.7
1 - 2 p.m.	12	5.7	1.4	6.1
2 - 3 p.m.	15	7.1	2.2	6.4
3 - 4 p.m.	17	8.1	3.4	8.6
4 - 5 p.m.	7	3.3	4.0	9.5
5 - 6 p.m.	17	8.1	6.8	7.6
6 - 7 p.m.	12	5.7	6.1	5.5
7 - 8 p.m.	16	7.6	4.0	4.4
8 - 9 p.m.	11	5.2	7.0	3.8
9 - 10 p.m.	13	6.2	5.7	3.0
10 - 11 p.m.	3	1.4	6.7	2.8
11 - 12 midnight	8	3.8	8.4	2.7
Totals	210	100.0	100.0	100.0

BETWEEN 8 P.M. AND 6 A.M., THERE WAS A HIGHER PROPORTION OF NON-LICENCED DRIVERS INVOLVED IN COLLISIONS.

ALCOHOL INVOLVEMENT IN COLLISIONS FOLLOWED A SIMILAR PATTERN.

Exhibit 3-13

IMPROPER DRIVER ACTIONS VS ENFORCEMENT

Apparent Improper Driver Action	Column A % of Improper Driver Actions In Collisions	Column B % of All Comparable Charges Laid in 1985 by Hamilton-Wentworth Police
Follow too close	18.7	2.0
Speed too fast	3.4	50.6
Improper turn	12.0	17.1
Disobey traffic signal	5.7	8.1
Disobey stop or yield sign	4.0	5.0
Fail to yield right-of-way	24.0	0.8
Improper passing	1.9	0.1
Lost Control	14.7	-
Wrong way on one-way street	0.3	1.2
Disobey other control	1.0	2.5
Other	14.3	12.6
	100.0	100.0

43% OF IMPROPER DRIVER ACTIONS ASSOCIATED WITH COLLISIONS ARE DRIVER ACTIONS WHICH CANNOT BE READILY ENFORCED, SUCH AS FOLLOWING TOO CLOSELY, OR FAILING TO YIELD THE RIGHT OF WAY.

A PREDOMINANT NUMBER OF CHARGES WERE LAID UNDER LAWS WHICH ARE READILY ENFORCED.

Exhibit 3-14

MOTORCYCLE DRIVER AGE VS DRIVER ACTION

Driver Action	0 - 14	15 - 19	20 - 24	25 - 34	35 - 44	45 +	Total	(%)
Driving Properly	-	27	46	39	10	8	130	50.8
Following Too Close	-	4	3	6	-	1	14	5.5
Speed Too Fast	-	4	3	5	-	-	12	4.7
Improper Turn	-	2	4	-	1	-	7	2.7
Disobey Traffic Signal	-	1	-	-	1	-	2	0.8
Disobey Stop Sign	-	-	-	1	-	-	1	0.4
Fail to Yield R.O.W.	-	3	6	1	-	-	10	3.9
Improper Passing	-	3	-	-	2	-	5	1.9
Lost Control	-	14	14	7	3	4	42	16.4
Wrong Way One-Way Street	-	-	1	-	-	-	1	0.4
Not Known	-	6	3	8	1	2	20	7.8
Other	-	6	2	2	2	-	12	4.7
Disobey Other Control	-	-	-	-	-	-	-	-
Totals	-	70	82	69	20	15	256	100.0
% Involved Motorcycle Drivers Driving Properly(a)	-	46.6	59.7	66.1	58.8	61.5	58.0	
% Involved Drivers Driving Properly for all Vehicle Types(a)	-	41.7	52.8	60.0	62.1	54.3	55.9	

MOTORCYCLE DRIVERS WERE MORE LIKELY TO BE DRIVING PROPERLY THAN MOTOR VEHICLE OPERATORS.

THE MOST FREQUENT IMPROPER MOTORCYCLE DRIVER ACTION WAS "LOST CONTROL".

a) Excluding "not known" and "other".

Exhibit 3-15

CYCLIST ACTION VS AGE OF CYCLIST

Apparent Cyclist Action	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24
Driving Properly	-	2	5	27	21
Following Too Close	-	-	1	-	-
Speed Too Fast	1	1	1	1	-
Improper Turn	-	2	3	3	1
Disobey Traffic Signal	-	-	1	2	-
Disobey Stop Sign	-	4	9	3	1
Fail to Yield Right-of-Way	-	10	12	4	1
Improper Passing	-	-	1	-	1
Lost Control	-	1	8	4	2
Wrong Way on One-Way Road	-	1	-	4	1
Not Known	-	5	6	5	6
Other	-	4	13	8	3
Disobey Other Control	-	-	3	1	-
Totals	1	30	63	62	37
% Involved Cyclists Driving Properly (a)	-	9.5	11.4	55.1	75.0

(a) Excluding "Not Known" and "Other".

25 - 34	35 - 44	45 - 54	55 +	Totals	(%)	Apparent Cyclist Action
22	9	1	1	88	36.1	Driving Properly
-	-	-	-	1	0.1	Following Too Close
-	-	-	-	4	1.7	Speed Too Fast
-	-	-	-	9	3.7	Improper Turn
2	-	-	-	5	2.1	Disobey Traffic Signal
1	-	-	-	18	7.4	Disobey Stop Sign
1	1	-	-	29	11.9	Fail to Yield Right-of-Way
1	-	-	-	3	1.2	Improper Passing
3	-	-	1	19	7.8	Lost Control
-	-	-	-	6	2.5	Wrong Way on One-Way Road
2	-	-	2	26	10.7	Not Known
3	-	-	1	32	13.1	Other
-	-	-	-	4	1.7	Disobey Other Control
35	10	1	5	244	100.0	**Totals**
73.3	90.0	100.0	50.0	47.3		% Involved Cyclists Driving

CYCLISTS UNDER 15 WERE MOST LIKELY TO BE DRIVING IN A MANNER THAT VIOLATED BASIC RULES OF THE ROAD.

Chapter Four
Pedestrians

General

In 1985, there were 408 pedestrian collisions resulting in 405 pedestrian injuries, and 3 fatalities. This represents a 28 percent increase in the total number of pedestrian collisions and a 50 percent reduction in fatalities of pedestrians involved in collisions.

Age

The relationship between the Regional population distribution and pedestrian involvement in collisions in 1985 was reviewed (Exhibit4-1). It was determined that 5 to 9 year old pedestrians had a rate of collision involvement approximately 3.2 times that expected when compared on the basis of the age distribution of the Regional population.

The variations in rate might be explained by certain pedestrian age groups crossing streets more frequently than others (i.e.exposure). It is, however, unlikely that the 5 to 9 year old group would have different exposure to traffic than the 10 to 14 year old group, and, therefore, the 5 to 9 year old pedestrian would appear to be considerably more prone to collision involvement.

Pedestrian Action

Exhibit 4-2 indicates the pedestrian action at the time of the collision versus pedestrian age. In general, the instances of unsafe pedestrian action for pedestrians involved in collisions were greater for pedestrians under 15 years of age.

This exhibit also indicates that the actions of "coming from behind a parked car" or "unexpectedly running into the roadway" accounted for 24.8 percent of the pedestrian actions at the time of the collisions. These unsafe actions are particularly associated with pedestrians under 15 years of age.

Pedestrian Action (Cont'd)

Examination of the data for pedestrian collisions at traffic signals indicates that pedestrians under the age of 20 were more likely to be involved in a collision as a result of their own unsafe action. (Exhibit 4-3).

In 61 percent of all pedestrian collisions recorded as proceeding with unsafe action, and in 54 percent of pedestrian collisions at traffic signals the pedestrian was recorded as proceeding properly.

Time of Collision

An analysis was performed on the time of day of collisions compared to pedestrian age (Exhibit 4-4) and it was determined that 33.3 percent of pedestrians were injured in collisions which occurred between 3 p.m. and 6 p.m. Fifty children between 5 and 14 years of age were involved in pedestrian collisions which occurred at school crossing times.* This represents 12.3 percent of the 408 pedestrians involved in collisions in 1985 or 41 percent of all involved 5 - 14 year olds. Of the 50 school age children involved, 11 were crossing at traffic signals.

* School crossing times: 8:00 a.m. - 9:15 a.m., 11:30 a.m. - 1:45 p.m., 3:30 p.m. - 4:45 p.m., Monday - Friday; excluding June, July and August.

Pedestrian Condition

In most cases, the condition of the pedestrian involved in the collision was reported as normal. However, in approximately 8 percent of the collisions involving pedestrians, the pedestrian condition was recorded as "had been drinking" or "impaired" (Exhibit 4-5).

Locations

Exhibit 4-6 compares the age of pedestrians involved in collisions with the type of traffic control. In 46.1 percent of the pedestrian collisions, the collision occurred at a mid-block or other location with no control. For pedestrians under 10 years of age, 60 percent were involved at mid-block or other locations with no control. This is to be expected, as the majority of collisions that involved a young pedestrian resulted from the pedestrian entering the roadway unexpectedly. (Exhibit 4-2).

Driver Action

Exhibit 4-7 indicates that in approximately 56 percent of the motor vehicle- pedestrian collisions, the driver was recorded as driving properly. This figure does not necessarily suggest that the drivers involved in these collisions were totally without blame but does indicate that a majority of pedestrian collisions are associated with improper pedestrian action or lack of awareness of traffic conditions at the time of the collision.

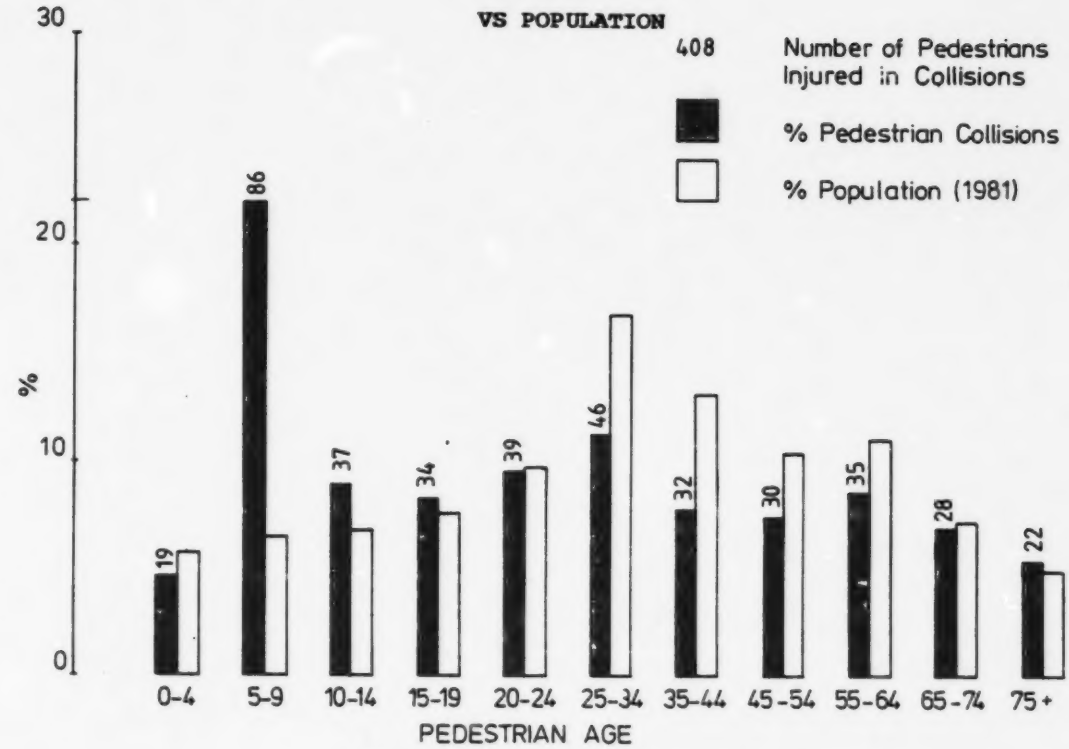
Of the 44 percent of motor vehicle-pedestrian collisions in which the driver was not driving properly, the most frequently recorded driver action was failing to yield the right-of-way (associated with 17 percent of all motor vehicle-pedestrian collisions).

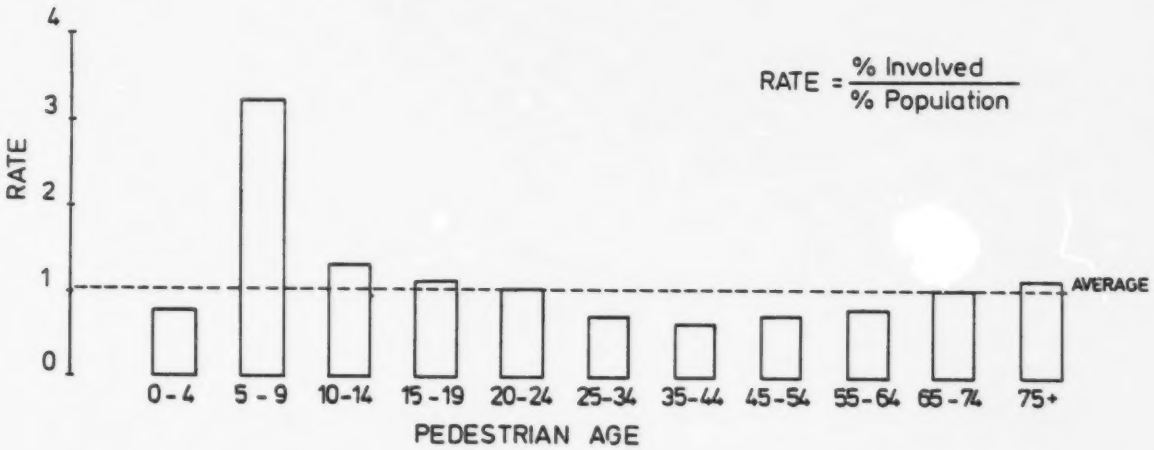
Pedestrian Injuries

Most pedestrians (approximately 83%) suffered only minimal or minor injuries when involved in a collision.

Exhibit 4-1

PEDESTRIAN AGE VS POPULATION





5 - 9 YEAR OLDS WERE INVOLVED IN COLLISIONS AT A RATE MORE THAN THREE TIMES GREATER THAN WOULD NORMALLY BE EXPECTED.

Exhibit 4-2

PEDESTRIAN AGE VS ACTION
(ALL LOCATIONS)

Pedestrian Action	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34
Crossing intersection with right-of-way	2	8	6	7	11	17
Crossing intersection without right-of-way *	1	8	4	7	2	4
Crossing intersection - no control	-	2	-	1	-	2
Walk with traffic *	-	1	2	-	1	1
Walk against traffic	-	-	-	-	2	-
On sidewalk or shoulder	2	2	3	4	3	5
Play/work on highway *	1	-	2	1	2	1
Come from behind parked car *	2	14	2	1	1	1
Run into roadway *	8	37	12	4	7	3
Cross through traffic *	3	11	3	5	6	9
Other	-	3	3	4	4	3
Totals	19	86	37	34	39	46
% Involved Pedestrians with Unsafe Action (Excluding "other")	78.9	85.5	73.5	60.0	54.3	44.2

* Actions considered unsafe

35 - 44	45 - 54	55 - 64	65 - 74	75 +	Total	(%)	Pedestrian Action
9	5	13	10	8	96	(23.5)	Crossing intersection with right-of-way
2	3	2	5	1	39	(9.6)	Crossing intersection without right-of-way*
-	3	3	1	1	13	(3.2)	Crossing intersection - no control
-	-	-	-	-	5	(1.2)	Walk with traffic *
-	-	1	-	-	3	(0.7)	Walk against traffic
4	3	1	5	1	33	(8.1)	On sidewalk or shoulder
2	1	-	-	-	10	(2.4)	Play/work on highway *
-	2	-	-	1	24	(5.9)	Come from behind parked car *
2	2	1	-	1	77	(18.9)	Run into roadway *
6	4	9	4	8	68	(16.7)	Cross through traffic *
7	7	5	3	1	40	(9.8)	Other
32	30	35	28	22	408	(100.0)	**Totals**
48.0	52.2	40.0	36.0	52.4	60.6		% Involved Pedestrians with Unsafe Action (Excluding "other")

THE INSTANCES OF UNSAFE PEDESTRIAN ACTIONS WERE HIGHEST FOR AGE GROUPS UNDER 15.

25% OF PEDESTRIANS INVOLVED IN COLLISIONS ENTERED THE ROADWAY UNEXPECTEDLY (CAME FROM BEHIND PARKED CARS OR RAN INTO THE ROADWAY).

Exhibit 4-3

PEDESTRIAN AGE VS ACTION
(AT TRAFFIC SIGNALS)

Pedestrian Action	0 - 4 Years	5 - 9 Years	10 - 14 Years	15 - 19 Years	20 - 24 Years	25 - 34 Years
Crossing Intersection with Right-of-Way	1	7	3	6	6	12
Crossing Intersection without Right-of-Way *	-	6	3	7	2	4
Walking on Roadway Against Traffic	-	-	-	-	-	-
On Sidewalk or Shoulder	-	-	1	-	1	-
Coming From Behind Parked Vehicle or Object *	-	1	-	-	-	-
Run Into Roadway *	-	6	1	1	3	-
Cross Through Traffic *	-	-	-	1	-	3
Other	-	-	1	1	4	2
Total	1	20	9	16	16	21
% Involving Pedestirans with Unsafe Action (a)	100.0	65.0	76.1	60.0	50.0	36.2

NOTES: (a) Not including "Other"
* Actions considered unsafe

35 - 44 Years	45 - 54 Years	55 - 64 Years	65 - 74 Years	75 + Years	Row Total	%	Pedestrian Action
7	3	11	6	6	68	(47.5)	Crossing Intersection with Right-of-Way
2	2	1	4	-	31	(21.7)	Crossing Intersection without Right-of-way
-	-	-	-	-	-	-	Walking on Roadway Against Traffic
-	-	-	-	-	2	(1.4)	On Sidewalk or Shoulder
-	-	-	-	1	2	(1.4)	Coming From Behind Parked Vehicle or Object *
2	1	-	-	-	14	(9.8)	Run Into Roadway
-	-	1	-	3	8	(5.6)	Cross Through Traffic *
2	2	4	2	-	18	(12.6)	Other
13	8	17	12	10	143	(100.0)	**Total**
36.4	50.0	15.4	40.0	40.0	45.6		% Involving Pedestrians with Unsafe Action (a)

PEDESTRIANS UNDER THE AGE OF 20 WERE MUCH MORE LIKELY TO BE INVOLVED IN A COLLISION WHILE CROSSING WITHOUT THE RIGHT-OF-WAY, (i.e., WITH UNSAFE ACTION).

Exhibit 4-4

TIME OF DAY VS PEDESTRIAN AGE

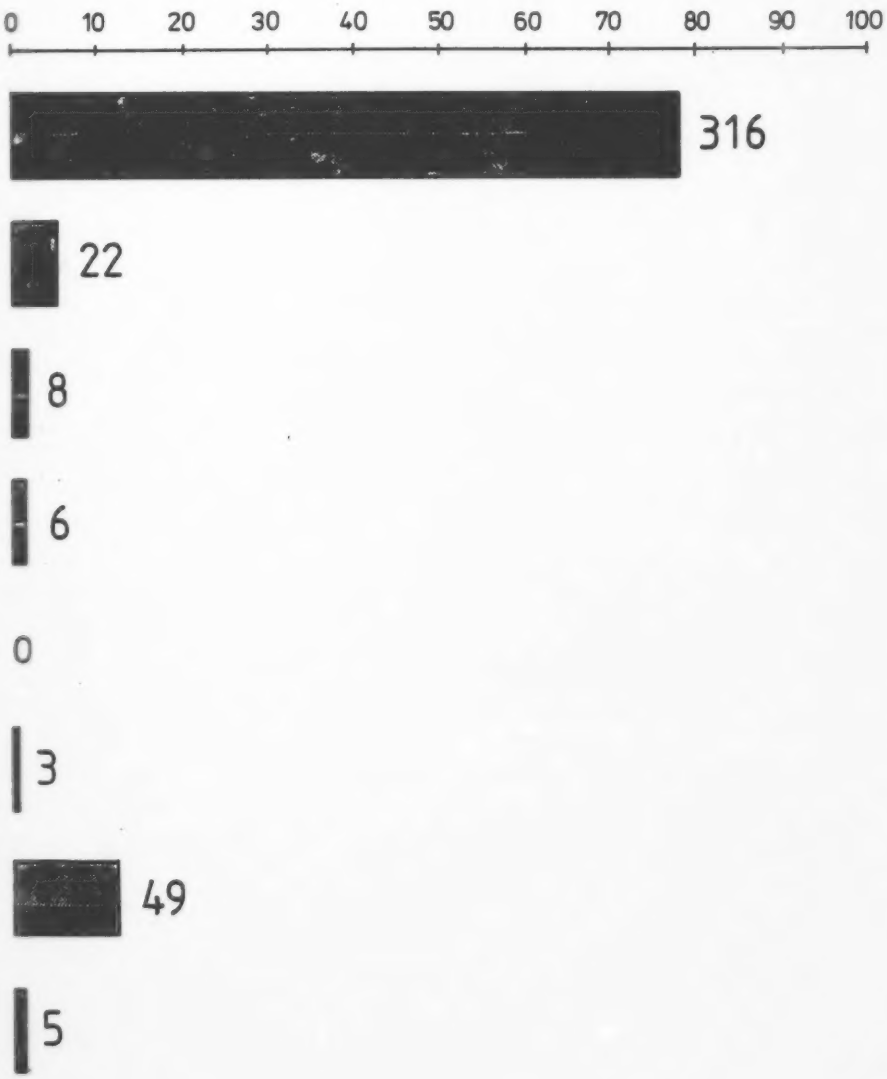
Time of Day	0-4 Yrs	5-9 Yrs	10-14 Yrs	15-19 Yrs	20-24 Yrs	25-34 Yrs	35-44 Yrs	45-54 Yrs	55-64 Yrs	65-74 Yrs	75 + Yrs	Row Total
12 - 1 a.m.	-	-	-	-	1	1	-	1	-	-	-	3
1 - 2 a.m.	-	-	-	-	4	1	-	1	-	-	-	6
2 - 3 a.m.	-	-	-	-	-	3	1	-	-	-	-	4
3 - 4 a.m.	-	-	-	-	1	-	-	-	-	-	-	1
4 - 5 a.m.	-	-	-	-	-	-	-	-	-	-	-	-
5 - 6 a.m.	-	-	-	-	-	-	-	-	-	-	1	1
6 - 7 a.m.	-	-	-	-	-	-	2	1	1	-	-	4
7 - 8 a.m.	-	1	-	2	1	1	-	-	-	-	-	5
8 - 9 a.m.	1	7	3	1	1	2	-	3	-	1	1	20
9 - 10 a.m.	-	-	-	2	1	1	-	1	4	1	-	10
10 - 11 a.m.	-	1	1	1	1	2	2	1	3	3	5	20
11 - 12 noon	1	8	1	1	1	4	-	2	5	3	2	28
12 - 1 p.m.	1	11	5	2	1	3	1	2	1	3	2	32
1 - 2 p.m.	3	3	3	-	2	3	2	-	4	3	2	25
2 - 3 p.m.	1	3	1	2	2	2	1	2	6	4	2	26
3 - 4 p.m.	2	12	6	5	3	6	2	5	3	2	-	46
4 - 5 p.m.	4	22	2	6	6	4	5	2	1	2	1	55
5 - 6 p.m.	2	8	8	2	2	5	5	-	-	1	2	35
6 - 7 p.m.	-	2	3	1	1	3	1	-	1	1	3	16
7 - 8 p.m.	3	8	2	1	3	2	3	2	3	1	-	28
8 - 9 p.m.	1	-	2	2	2	-	-	3	2	2	1	15
9 - 10 p.m.	-	-	-	2	2	1	3	1	-	1	-	10
10 - 11 p.m.	-	-	-	2	3	-	2	2	1	-	-	10
11 - 12 a.m.	-	-	-	2	1	2	2	1	-	-	-	8
Total	19	86	37	34	39	46	32	30	35	28	22	408

33% OF PEDESTRIANS WERE INJURED IN COLLISIONS WHICH OCCURRED BETWEEN 3 P.M. AND 6 P.M.

Exhibit 4-5

PEDESTRIAN CONDITION

PERCENT OF PEDESTRIANS INVOLVED IN COLLISIONS



8.5 PERCENT OF PEDESTRIANS INCLUDED IN COLLISIONS WERE RECORDED AS BEING IMPAIRED OR HAD BEEN DRINKING (EXCLUDING NOT KNOWN AND OTHER).

Exhibit 4-6

PEDESTRIAN AGE VS TYPE OF TRAFFIC CONTROL

Type of Control	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34	35 - 44
Traffic Signal	1	20	9	16	16	21	13
Stop Sign	1	17	7	3	6	10	6
Yield Sign	1	-	-	-	-	-	-
School Guard	-	1	1	-	-	-	-
School Bus	-	-	-	-	-	-	-
No Control	16	47	20	15	17	15	13
Other	-	1	-	-	-	-	-
Totals	19	86	37	34	39	46	32
% Pedestrians Involved in Collisions at Midblock or Other Locations With No Control	84.2	55.8	54.1	44.1	43.6	32.6	40.6

45 - 54	55 - 64	65 - 74	75 +	Totals	(%)	Type of Control
8	17	12	10	143	(35.1)	Traffic Signal
4	6	8	6	74	(18.1)	Stop Sign
-	-	-	-	1	(0.3)	Yield Sign
-	-	-	-	2	(0.5)	School Guard
-	-	-	-	-	(0.0)	School Bus
17	12	8	5	185	(45.3)	No Control
1	-	-	1	3	(0.7)	Other
30	35	28	22	408	(100.0)	**Totals**
60.0	34.3	28.6	27.3	46.1		% Pedestrians Involved in Collisions at Mid-Block or Other Locations With No Control

46% OF PEDESTRIAN COLLISIONS OCCURRED AT MID-BLOCK OR OTHER LOCATIONS WITH NO CONTROL.

FOR PEDESTRIANS UNDER 10 YEARS OF AGE, 60% WERE INVOLVED AT MID-BLOCK OR OTHER LOCATIONS WITH NO CONTROL.

Exhibit 4-7

DRIVER ACTION IN PEDESTRIAN COLLISIONS

Action	No. Pedestrian Collisions	% Pedestrian Collisions
Driving Properly	224	56.0
Following Too Closely	1	0.2
Speed Too Fast	1	0.2
Improper Turn	7	1.8
Disobey Traffic Signal	10	2.5
Disobey Stop Sign	-	-
Fail to Yield Right-of-Way	67	16.7
Improper Passing	1	0.2
Wrong Way One-Way Street	3	0.8
Lost Control	10	2.5
Not Known	50	12.5
Other	23	5.8
Disobey Other Control	3	0.8
	400 (a)	100.0

56% OF THE MOTOR VEHICLE DRIVERS INVOLVED IN PEDESTRIAN COLLISIONS WERE RECORDED AS DRIVING PROPERLY.

THE MOST FREQUENTLY RECORDED IMPROPER DRIVER ACTION WAS FAILURE TO YIELD THE RIGHT-OF-WAY.

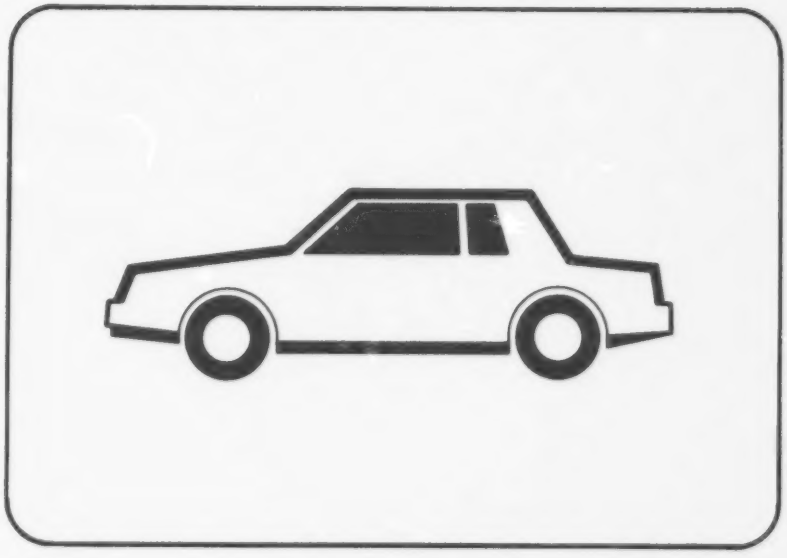
(a) Note - Pedestrian collisions involved more than one driver or vehicle in some cases. Data not available on driver action in several collisions.

Exhibit 4-8

PEDESTRIAN AGE VERSUS INJURY STATUS

Pedestrian Age	Status of Inury				Total	% Major or Fatal Injury
	Minimal	Minor	Major	Fatal		
0 - 4	7	9	3	-	19	15.8
5 - 9	35	41	10	-	86	11.6
10 - 14	15	16	6	-	37	16.2
15 - 19	16	15	3	-	34	8.8
20 - 24	13	19	7	-	39	17.9
25 - 34	15	23	8	-	46	17.4
35 - 44	12	15	5	-	32	15.6
45 - 54	8	13	8	1	30	30.0
55 - 64	8	22	4	1	35	14.3
65 - 74	5	18	5	-	28	17.9
75 & Over	2	13	6	1	22	31.8
TOTAL	136	204	65	3	408	16.7
%	33.4	50.0	15.9	0.7	100.0	

OF ALL PEDESTRIANS INVOLVED IN COLLISIONS, 83% SUFFERED ONLY MINIMAL OR MINOR INJURIES.



Chapter Five
Vehicles

Vehicle Type

For drivers involved in collisions,the percentage of drivers driving properly was highest for drivers of conventional buses(Exhibit 5-1). Caution should be exercised when interpreting this exhibit as there is no indication of vehicle exposure.

Vehicle Defects

Vehicle defects were recorded for 163 or approximately 1 percent of the vehicles involved in 1985 collisions (Exhibit5-2). The most frequently recorded defect was a poor or ineffective vehicle braking system. Although a vehicle defect was recorded, it does not necessarily follow that the defect was the proximate cause of the collision.

Exhibit 5-1

DRIVER ACTION VS VEHICLE TYPE

Driver Action	Non-motor Vehicle	Passenger Car	Car and Trailer	Truck	Truck and Semi	Truck and Trailer
Driving Properly	88	5,494	7	548	35	33
Follow Too Close	1	955	1	119	6	6
Speed Too Fast	4	179	-	17	1	-
Improper Turn	9	613	2	68	12	11
Disobey Traffic Signal	5	300	-	39	1	-
Disobey Stop Sign	18	212	-	25	-	4
Fail to Yield R.O.W.	29	1,296	2	116	4	5
Improper Passing	3	94	-	11	-	1
Lost Control	19	759	-	71	4	2
Wrong Way on One-Way	6	18	-	2	-	-
Not Known	28	765	-	82	10	7
Other	32	712	4	151	13	10
Disobey Other Control	4	50	-	6	-	3
Totals	246	11,447	16	1,255	86	82
% Involved Drivers Driving Properly (a)	47.3	55.1	58.3	53.6	55.6	50.8

FOR DRIVERS INVOLVED IN COLLISIONS, THE PERCENTAGE OF DRIVERS RECORDED AS DRIVING PROPERLY WAS HIGHEST FOR DRIVERS OF CONVENTIONAL-TYPE BUSES.

(a) Excluding "not known" and "other".

Motor-Cycle	Bus	School Bus	Other	Totals	(%)	Driver Action
131	141	3	2	6,482	(47.7)	Driving Properly
14	4	-	-	1,106	(8.1)	Follow Too Close
12	-	-	-	213	(1.6)	Speed Too Fast
7	6	-	-	728	(5.4)	Improper Turn
2	1	-	-	348	(2.6)	Disobey Traffic Signal
1	1	-	-	261	(1.9)	Disobey Stop Sign
10	4	3	-	1,469	(10.8)	Fail to Yield R.O.W.
5	1	1	-	116	(0.8)	Improper Passing
42	7	-	-	904	(6.7)	Lost Control
1	-	-	-	27	(0.2)	Wrong Way on One-Way
22	6	-	1	921	(6.8)	Not Known
12	7	-	1	942	(6.9)	Other
-	2	-	-	65	(0.5)	Disobey Other Control
259	180	7	4	13,582	(100.0)	**Totals**
58.2	84.4	42.9	100.0	55.3		% Involved Drivers Driving Properly (a)

Exhibit 5-2

VEHICLE DEFECTS

Defect Type	Non Motor Vehicle	Passenger Cars	Car and Trailer	Truck	Truck and Trailer	Truck and Semi	Motor-Cycle	Bus	School Bus	Other	Totals	%
Brakes	4	21	-	8	-	-	-	2	-	-	35	21.5
Steering	-	6	-	-	-	-	-	-	-	-	6	3.7
Tire Puncture or Blowout	-	10	-	-	-	-	1	-	-	-	11	6.7
Tire Tread Insufficient	-	10	-	-	-	-	2	-	-	-	12	7.4
Headlamps Defective	1	2	-	-	-	-	1	-	-	-	4	2.4
Other Lamps or Reflectors Defective	1	7	-	1	-	-	1	-	-	-	10	6.1
Engine Control Defective	-	14	-	1	-	-	1	-	-	-	16	9.8
Wheels or Suspension Defective	-	4	-	1	-	1	-	-	-	-	6	3.7
Vision Obscured	-	8	-	-	-	-	-	-	-	-	8	4.9
Trailer Hitch Defective	-	4	1	1	-	-	-	-	-	-	6	3.7
Other	3	39	-	5	1	-	1	-	-	-	49	30.1
Totals	9	125	1	17	1	1	7	2	-	-	163	100.0
Defective Vehicles as a % of all vehicles of the same type involved in collisions (a)	3.7	1.0	6.3	1.3	1.1	1.1	2.7	1.1	0.0	0.0	1.1%	

(a) Does not include parked vehicles.

DEFECTIVE BRAKES ACCOUNTED FOR 22% OF THE RECORDED DEFECTS.

Chapter Six
Environment

Light Conditions

Exhibit 6-1 indicates that most collisions occurred under clear visibility conditions. Although poor light conditions can make driving difficult, collisions under these conditions are probably associated with drivers failing to adjust properly to changed conditions, particularly those associated with the roadway surface. Exhibit 6-2 indicates that 66.8 percent of the collisions occurred under daylight conditions.

Road Surface

An estimated 57.8 percent of collisions occurred under dry pavement conditions (Exhibit 6-3).

Pavement Markings

In accordance with Exhibit 6-4, 80.0 percent of collisions occurred on marked roadways where the markings were visible. In 83 percent of the cases where the road markings were recorded as not visible or obscured, snow, slush, or ice conditions were also reported. It is important to note that pavement markings that are not visible to the driver are not necessarily associated with collision cause. Further analysis would be necessary to indicate whether or not there was a casual relationship.

Road Character

Exhibits 6-5 and 6-6 show that of collisions occurring at intersections, 62.8 percent occurred at the intersection of two, two-way undivided roads and 85.5 percent occurred at the intersection of two roadways with straight and level alignment.

Road Character (Cont'd)

Exhibits 6-7 and 6-8 show that, for collisions occurring at locations other than intersections, 76.6 percent occurred on two-way undivided roadways and 79.5 percent occurred on straight and level alignment.

As normalizing data such as the percentages, various categories of intersections and the traffic volumes passing through those intersections is not presently available, it is not possible to state that one intersection type is less prone to collision occurrence than another. However, the reader is referred to Exhibit 7-4 in regard to signalized intersections and Exhibit 7-7 in regard to arterial roadway sections.

Road Location and Traffic Control

Exhibit 6-9 indicates that the greatest number of collisions occurred at non-intersection locations. If the intersection-related and in-intersection categories are combined, there were a greater number of collisions directly or indirectly related to intersections. As the exposure to vehicle conflicts is inherently greater at intersection locations, this result is not unexpected.

Exhibit 6-10 indicates that collisions occurring at signalized intersections have approximately the same chance of resulting in serious injury than do collisions occurring at stop-or yield-controlled intersections, or locations with no control.

Exhibit 6-11 indicates that the measured point of impact of 51.4 percent of all collisions was within nine metres of the curb lines of an intersection. 27.4 percent of collisions occurred at signalized intersections, and 10.0 percent of collisions occurred within nine metres of intersections with no formal control.

Road Condition

An estimated 98 percent of roads were in good condition at the time of the collision (Exhibit 6-12). Although some roadways were under construction or under repair in the vicinity of the collision, this does not directly imply that road condition was a contributing cause of the collision.

Fixed Objects

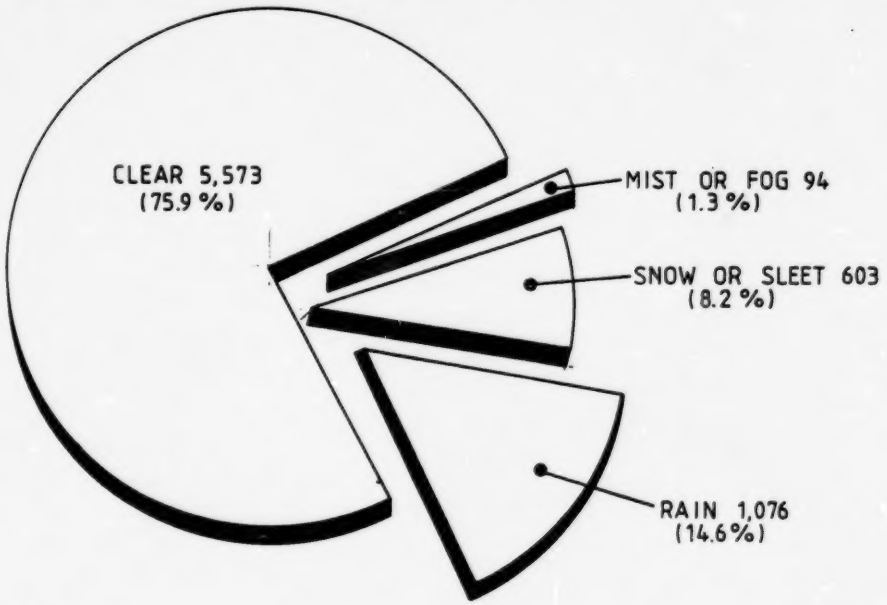
There were 1,060 recorded cases where vehicles struck fixed objects adjacent to the road (Exhibits 6-13 and 6-14). Twenty-five percent of the fixed objects struck by vehicles were rigid poles. In 70 percent of all fixed object collisions, a single motor vehicle left the roadway and struck a roadside object as its primary impact. In the remaining cases (30 percent), it would appear that the fixed object was struck after impact with another vehicle or pedestrian.

The chances of injury or death occurring were higher in collisions involving two or more vehicles in which a fixed object was struck than in single motor vehicle fixed object collisions. This may reflect the different nature of the types of collisions.

Eight collisions in which a fixed object was struck resulted in fatalities. This frequency is approximately three times the rate of occurrence of fatalities in collisions in which no fixed object was involved.

Exhibit 6-1

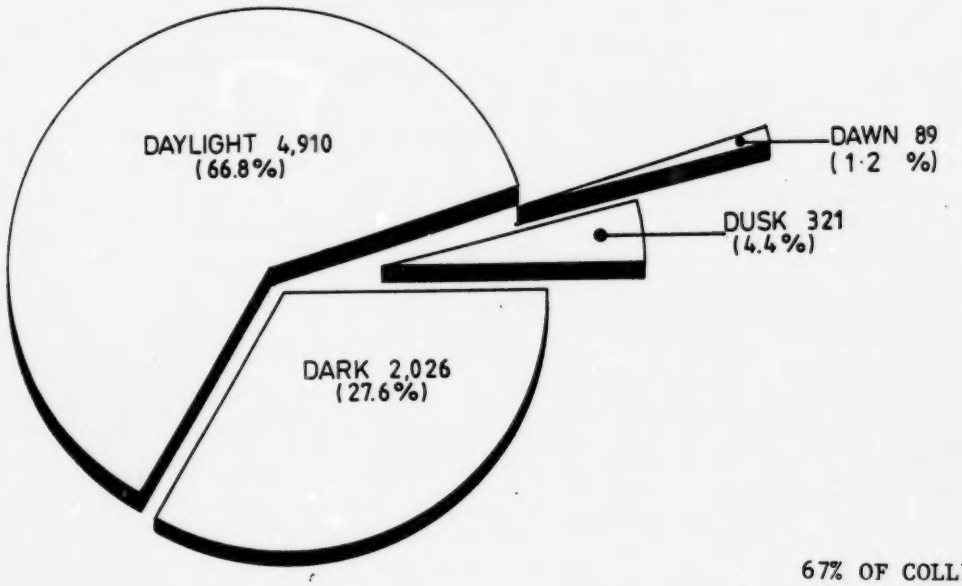
VISIBILITY CONDITIONS



76% OF COLLISIONS OCCURRED DURING CLEAR VISIBILITY CONDITIONS.

Exhibit 6-2

LIGHT CONDITIONS



67% OF COLLISIONS OCCURRED DURING DAYLIGHT CONDITIONS.

SURFACE CONDITIONS

Exhibit 6-3

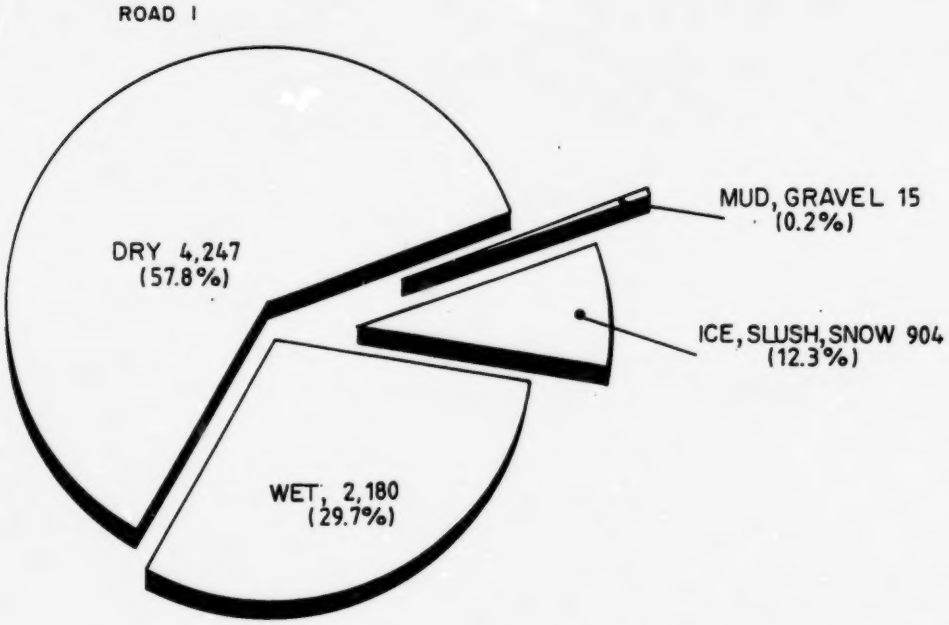


Exhibit 6-4

PAVEMENT MARKINGS VS
ROAD SURFACE CONDITIONS

SURFACE	MARKINGS: GOOD	FAIR	NOT VISIBLE OBSCURED	NONE
DRY	3525 48.0%	155 2.1%	37 0.5%	530 7.2%
WET	1793 24.4%	108 1.5%	75 1.0%	204 2.8%
SNOW SLUSH ICE	238 3.2%	19 0.3%	528 7.2%	119 1.6%
MUD GRAVEL	2 0.0%	2 0.0%	1 0.0%	10 0.1%

80% OF COLLISIONS OCCURRED ON ROADWAYS WHERE THE MARKINGS WERE VISIBLE.

Exhibit 6-5

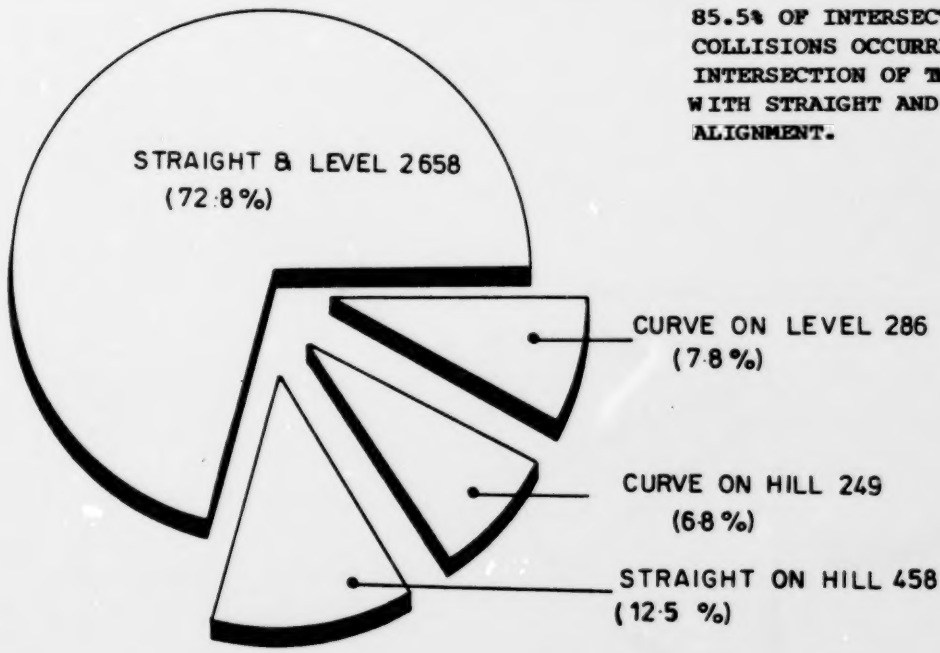
ROAD CHARACTERISTICS
(INTERSECTION COLLISIONS)

ROAD 2 \ ROAD 1	STRAIGHT & LEVEL	STRAIGHT ON HILL	CURVE ON LEVEL	CURVE ON HILL	
STRAIGHT & LEVEL	3104				
STRAIGHT ON HILL	178	106			
CURVE ON LEVEL	69	10	44		
CURVE ON HILL	24	16	5	21	
TOTALS	3 375	132	49	21	3577

62.8% OF COLLISIONS AT INTERSECTIONS OCCURRED AT THE INTERSECTION OF TWO TWO-WAY UNDIVIDED ROAD.

Exhibit 6-6

ROAD ALIGNMENT
(INTERSECTION COLLISIONS)



85.5% OF INTERSECTION COLLISIONS OCCURRED AT THE INTERSECTION OF TWO ROADS WITH STRAIGHT AND LEVEL ALIGNMENT.

Exhibit 6-7

ROAD CHARACTERISTICS
(NON-INTERSECTION COLLISIONS)

ROAD 1

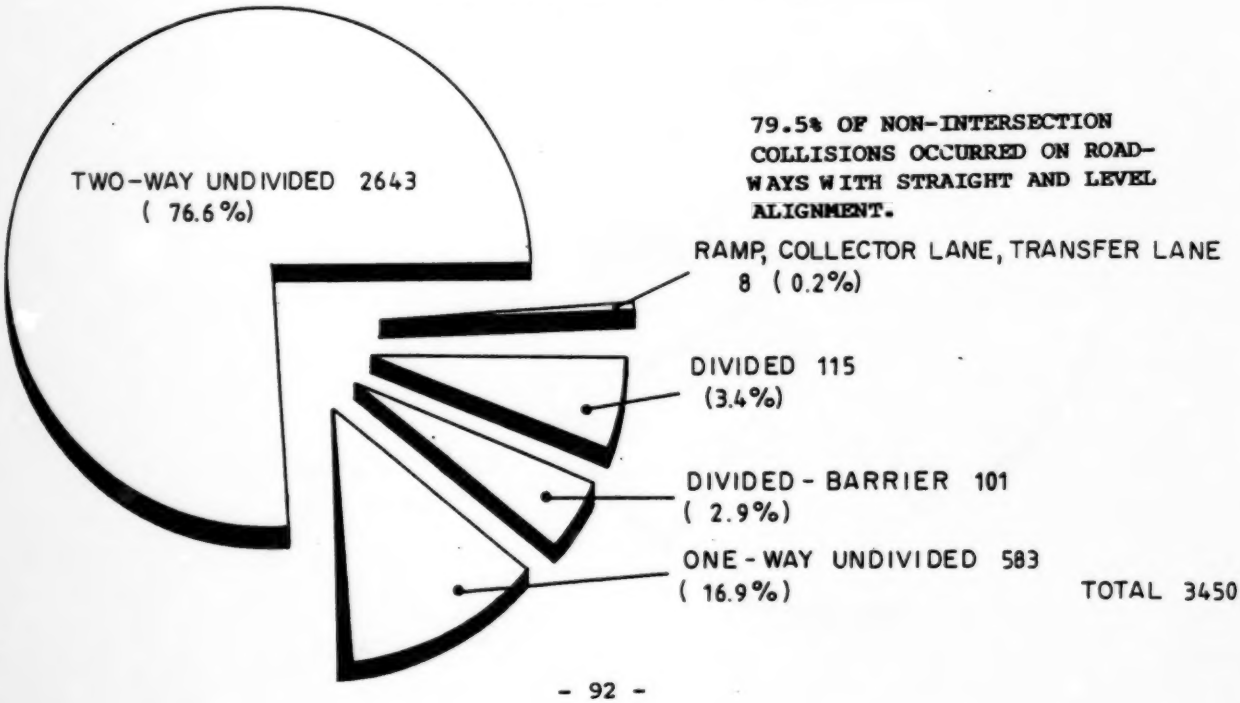
ROAD 2

ROAD 2 \ ROAD 1	ONE-WAY UNDIVIDED	TWO-WAY UNDIVIDED	DIVIDED BARRIER	DIVIDED	COLLECTOR LANES RAMPS	
ONE-WAY UNDIVIDED	624					
TWO-WAY UNDIVIDED	445	2368				
DIVIDED BARRIER	17	35	61			
DIVIDED	33	87	1	89		
COLLECTOR LANES RAMPS	1	5	2	3	1	
TOTAL	1120	2495	64	92	1	3772

76.6% OF COLLISIONS OCCURRING AT NON-INTERSECTION LOCATIONS OCCURRED ON TWO-WAY UNDIVIDED ROADWAYS.

Exhibit 6-8

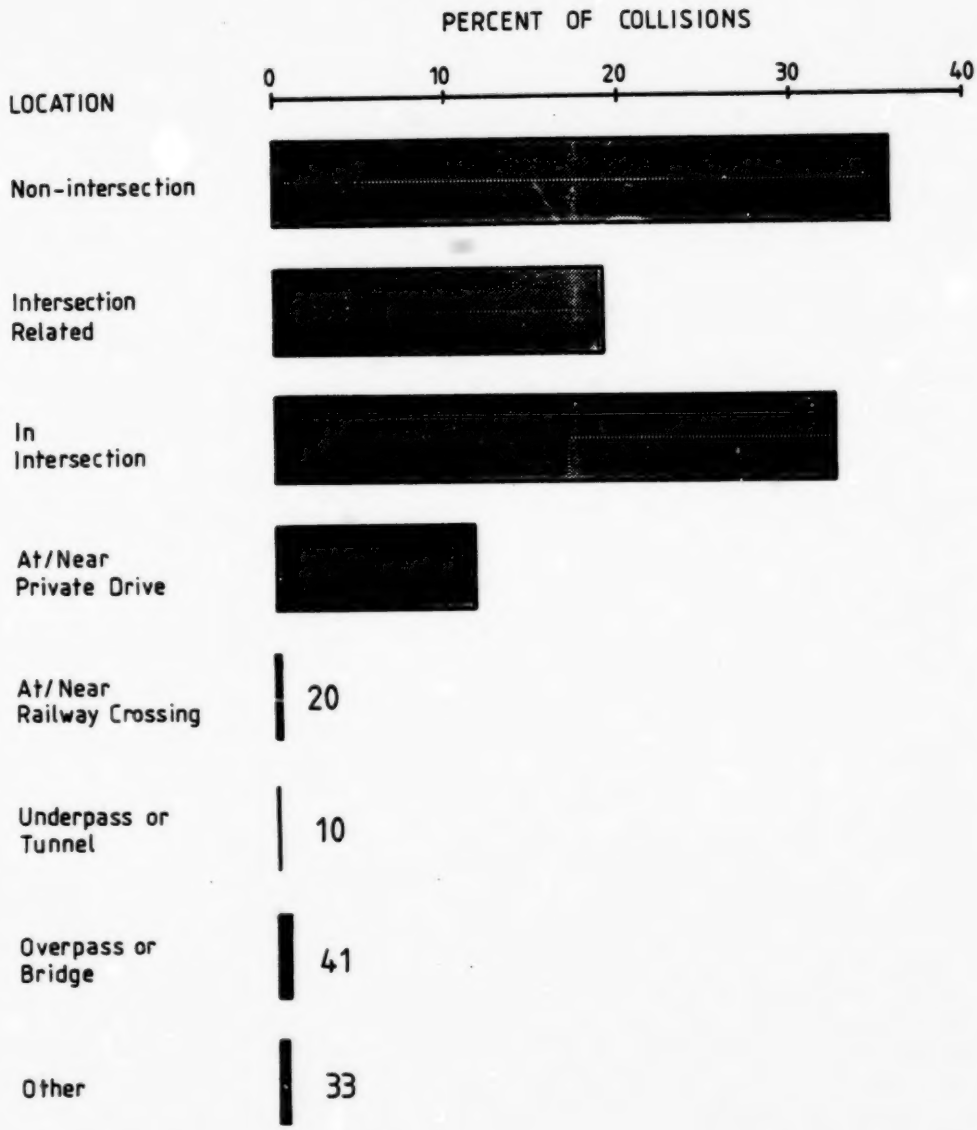
ROAD ALIGNMENT.
(NON INTERSECTION COLLISIONS)



79.5% OF NON-INTERSECTION COLLISIONS OCCURRED ON ROADWAYS WITH STRAIGHT AND LEVEL ALIGNMENT.

Exhibit 6-9

LOCATION OF COLLISIONS



APPROXIMATELY 50% OF ALL COLLISIONS OCCURRED AT NON-INTERSECTION LOCATIONS.

Exhibit 6-1C

TRAFFIC CONTROL VS CLASS OF COLLISION

Traffic Control	Fatal Injury	Non-Fatal Injury	Property Damage Only	Totals	% of Total Number of Collisions	% Fatal or Injury Collisions
Traffic Signal	3	943	1,071	2,017	27.5	46.9
Stop Sign	6	691	979	1,676	22.8	41.6
Yield Sign	-	31	31	62	0.8	50.0
Police Control	-	5	4	9	0.1	55.6
School Guard	-	3	4	7	0.1	42.9
School Bus	-	1	1	2	0.0	50.0
No Control	12	1,460	2,056	3,528	48.1	41.7
Other	-	19	26	45	0.6	42.2
Totals	21	3,153	4,172	7,346	(100)	43.2

COLLISIONS OCCURRING AT SIGNALIZED INTERSECTIONS HAVE APPROXIMATELY THE SAME CHANCE OF RESULTING IN INJURY AS DO COLLISIONS OCCURRING AT STOP- OR YIELD-CONTROLLED INTERSECTIONS, OR LOCATIONS WITH NO CONTROL.

Exhibit 6-11

TRAFFIC CONTROL VS ROAD LOCATION

Distance From Intersection	Traffic Signal	Stop Sign	Yield Sign	Police Control	School Guard	School Bus	No Control	Other	Total	%
In Intersection (Within 9 Metres)	1,546	1,357	45	5	2	1	799	18	3,773	51.4
9.1 to 20 Metres	207	108	8	-	1	-	531	7	862	11.7
20.1 to 40 Metres	128	78	4	2	1	-	603	2	818	11.1
40.1 to 60 Metres	48	37	1	-	-	-	353	4	442	6.0
Over 60 Metres	88	96	4	2	3	1	1,243	14	1,45 1	19.8
Totals	2,017	1,676	62	9	7	2	3,528	45	7,346	100.

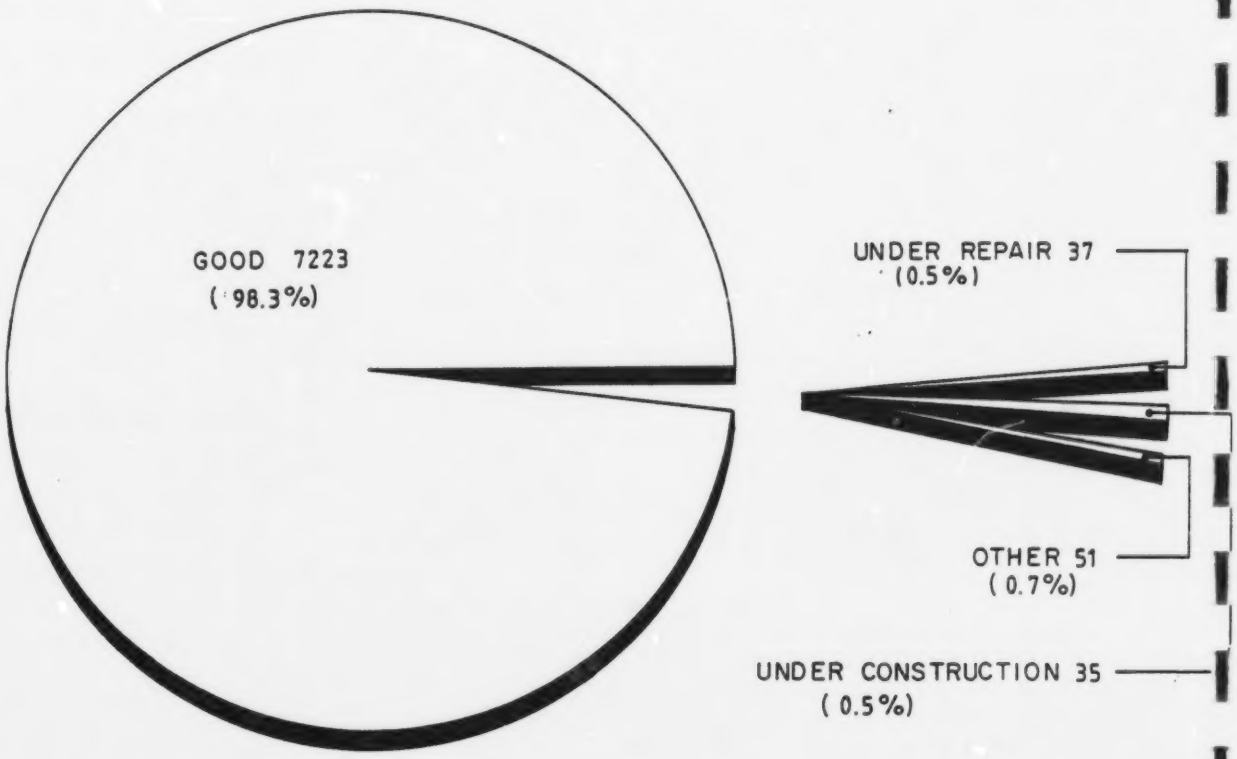
63% OF ALL COLLISIONS OCCURRED WITHIN 20 METRES OF AN INTERSECTION.

28% OF ALL COLLISIONS OCCURRED AT A SIGNALIZED INTERSECTION.

ENVIRONMENT

Exhibit 6-12

ROAD CONDITION



IN LESS THAN 2% OF COLLISIONS WHERE ROADWAY CONDITIONS REPORTED AS BEING LESS THAN GOOD - (I.E. UNDER REPAIR OR CONSTRUCTION).

Exhibit 6-13

FIXED OBJECTS STRUCK VERSUS ROAD LOCATION

Object Struck	Non-Intersection	Intersection Related	In Intersection	ROAD LOCATION Private Drive	Railroad Crossing	Underpass or Tunnel	Overpass or Bridge	Other	Total	%	% Single Motor Vehicle
Restraining Barrier	65	2	5	1	-	-	10	3	86	8.1	72.1
Rigid Pole	131	58	55	12	1	-	2	1	260	24.5	71.2
Break-away Pole	26	13	8	2	-	-	1	1	51	4.8	76.5
Tree Post (Sign; Parking Meter)	33	15	15	8	-	-	-	1	72	6.8	62.5
Fence	31	17	8	4	1	-	-	-	61	5.8	68.9
Culvert	11	-	2	4	-	-	-	17	17	1.6	58.8
Bridge Support	3	2	1	1	-	4	6	-	17	1.6	94.1
Rock Face	4	1	1	-	-	1	-	1	8	0.7	100.0
Snowbank or Drift	10	3	1	1	-	-	-	-	15	1.4	33.3
Ditch	84	12	12	6	-	-	-	-	114	10.8	80.7
Curb	43	17	22	9	-	2	-	3	96	9.1	51.0
Crash Cushion	-	2	-	-	-	-	1	-	3	0.3	33.3
Building or Wall	24	10	13	3	-	-	-	-	50	4.7	58.0
Other	65	28	14	11	3	-	2	1	124	11.7	78.2
Total	582	193	169	71	5	7	22	11	1,060	100.0	70.1

25% OF FIXED OBJECTS STRUCK BY ALL VEHICLES WERE RIGID POLES.
70% OF COLLISIONS INVOLVING FIXED OBJECTS WERE SINGLE MOTOR VEHICLE COLLISIONS.

Exhibit 6-14

FIXED OBJECT VERSUS CLASS OF COLLISION

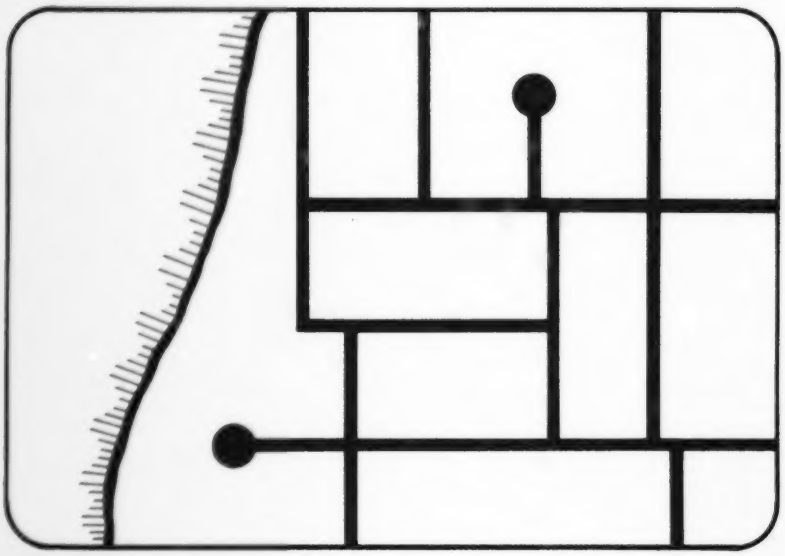
Object Struck	Fatal	Personal Injury	Property Damage Only	Total	% Fatal or Injury
Restraining Barrier	2	28	56	86	34.9
Rigid	2	123	135	260	48.1
Breakaway Pole	-	19	32	51	37.3
Tree	-	37	49	86	43.0
Post, Sign, Parking Meter	-	18	54	72	25.0
Fence	-	21	40	61	34.4
Culvert	-	8	9	17	47.1
Bridge Support	-	6	11	17	35.3
Rock Face	-	6	2	8	75.0
Snowbank or Drift	-	5	10	15	33.3
Ditch	1	51	62	114	45.6
Curb	2	55	39	96	59.4
Crash Cushion	-	-	3	3	-
Building or Wall	1	24	25	50	50.0
Other	-	50	74	124	40.3
Total	8	451	601	1,060	43.3
Single Motor Vehicle Collisions	5 0.7%	296 39.8%	442 59.5%	743 100.0%	
Collisions Involving Two or More Vehicles	3 0.9%	155 48.9%	159 50.2%	317 100.0%	

THE PROBABILITY OF INJURY OR DEATH IS HIGHEST FOR COLLISIONS IN WHICH A ROCK FACE IS HIT.

THE CHANCE OF INJURY OR DEATH IN A COLLISION IN WHICH A FIXED OBJECT IS HIT IS HIGHER WHEN TWO OR MORE VEHICLES ARE INVOLVED.

FIVE SINGLE MOTOR VEHICLE COLLISIONS IN WHICH FIXED OBJECTS WERE STRUCK RESULTED IN FATALITIES.

ENVIRONMENT



Chapter Seven
Locations

General

Locations that have high numbers or rates of collision occurrences have received regular attention by roadway authorities in the Region and countermeasures are constantly being implemented on existing facilities and incorporated into the design of new facilities. However, physical alterations are not effective in preventing the majority of traffic collisions as these are the direct result of driver or pedestrian error.

Area Municipality

In general, the collision rate increased with increasing municipality size (Exhibit 7-1).

High Frequency Intersection Locations

Exhibit 7-2 represents a list of the 71 locations which experienced the highest number of collision occurences in 1985. All 1985 collisions occuring at traffic signals were subjected to the control chart analysis technique (Exhibit 7-3). Additional information including collision data from previous years is included with this exhibit.

Exhibit 7-4 shows the relative number of collisions and collision rates for selected groups of signalized intersections.

These exhibits do not necessarily represent priority lists for improvements as other factors have to be taken into account such as cost-benefit considerations or the deployment of other countermeasure opportunities which may be more cost-effective.

In many cases, these locations are already under consideration for various forms of improvement on a priority basis.

High Frequency Road Section Locations

Exhibits 7-5, 7-6 and 7-7 portray arterial roadway sections within the City of Hamilton which have the highest collision rates. The criteria for reporting is collisions per million vehicle kilometres travelled per annum. Exhibit 7-5 evaluates roadway sections including all collisions along the roadway. Exhibit 7-6 demonstrates collision rates on roadway sections excluding collisions occurring within 9 metres of a signalized intersection. Exhibit 7-7 shows collision rates on roadway sections excluding collisions occurring at all intersections, signalized or non-signalized. Exhibit 7-8 presents a summary of collision rates for selected groups and subcategories of the arterial system.

The trends over the past nine years are interesting to note when reviewing ing Exhibit 7-7. As the overall number of collisions within the City of Hamilton and Region has been dropping since 1977, with traffic volumes relatively constant, collision rates on roadway sections show a parallel decline.

Exhibit 7-1

COLLISIONS VS AREA MUNICIPALITY

Class of Collision (a)

Municipality	Fatal	Non-Fatal Injury	Property Damage Only	All Collisions	1985 Collision Rate per 1,000 Pop.(b)
Ancaster	1	79	116	196	11.8
Dundas	1	99	152	252	12.5
Flamborough	3	111	185	299	11.7
Glanbrook	1	41	62	104	11.0
City of Hamilton	14	2,541	3,315	5,870	19.1
Stoney Creek	1	282	342	625	14.9
Total for the Regional Municipality of Hamilton-Wentworth	21	3,153	4,172	7,346	17.4

COLLISION RATE IN TERMS OF COLLISIONS PER 1,000 POPULATION GENERALLY INCREASED WITH INCREASED MUNICIPALITY SIZE.

(a) Collisions reported to the Hamilton-Wentworth Regional Police only; areas patrolled by the Provincial Police (e.g. Kings Highways) are not included.

(b) 1985 Regional Assessment Office population figures used.

Exhibit 7-2

INTERSECTIONS WITH HIGHEST NUMBER OF COLLISIONS IN 1985 (a)

	Intersection	Type of Traffic Control	Number of Collisions	5 Yr. Average
1.	Queenston/Centennial	Traffic Signal	25	23.4
2.	Hunter/Catharine	1-Way Stop	22	8.0
3.	Main/John	Traffic Signal	21	19.0
4.	Main/Bay	Traffic Signal	18	13.6
5.	Barton/Centennial	Traffic Signal	17	13.8
6.	Barton/Woodward	Traffic Signal	17	16.0
7.	Fennell/Upper Ottawa	Traffic Signal	17	14.0
8.	King/Dundurn	Traffic Signal	17	12.6
9.	Mohawk/Upper Ottawa	Traffic Signal	17	10.8
10.	York/Dundurn	Traffic Signal	16	13.0
11.	Charlton/Sherman Access	Traffic Signal	15	13.2
12.	Fennell/Upper Wentworth	Traffic Signal	15	13.0
13.	Queenston/Nash	Traffic Signal	15	16.6
14.	Main/Victoria	Traffic Signal	14	20.0
15.	Main/Wentworth	Traffic Signal	14	6.8
16.	Britannia/Kenilworth	Traffic Signal	13	7.2
17.	Dunsmure/Kenilworth	1-Way Stop	13	10.0
18.	King/Centennial	Traffic Signal	13	15.4
19.	King/Gage	Traffic Signal	13	8.2
20.	Mohawk/Upper Paradise	Traffic Signal	13	15.6
21.	Queensdale/Upper Gage	Traffic Signal	13	10.8
22.	Barton/Mary	1-Way Stop	12	7.2

	Intersection	Type of Traffic Control	Number of Collisions	5 Year Average
23.	Brampton/Parkdale	Traffic Signal	11	10.0
24.	Cannon/Kenilworth	Traffic Signal	11	9.0
25.	King/Queen	Traffic Signal	11	10.4
26.	Main/Longwood	Traffic Signal	11	9.6
27.	Rymal/Upper James	Traffic Signal	11	12.4
28.	Wilson/John	Traffic Signal	11	7.6
29.	Aberdeen/Dundurn	Traffic Signal	10	11.6
30.	Burlington/Ottawa	Traffic Signal	10	7.6
31.	Cannon/Victoria	Traffic Signal	10	6.4
32.	Hunter/John	Traffic Signal	10	10.0
33.	King/Kenilworth	Interchange	10	7.4
34.	King/Parkdale	Traffic Signal	10	10.0
35.	King/Quigley	Traffic Signal	10	7.6
36.	Main/Dundurn	Traffic Signal	10	16.8
37.	Main/Locke	Traffic Signal	10	9.0
38.	Main/Ottawa	Traffic Signal	10	6.6
39.	Queenston/Parkdale	Traffic Signal	10	7.8
40.	York/Queen	Traffic Signal	10	11.8
41.	Barton/Parkdale	Traffic Signal	9	9.6
42.	Barton/MacNab	1-Way Stop	9	6.8
43.	Cannon/Gage	Traffic Signal	9	8.8
44.	King/Cochrane	Traffic Signal	9	7.8
45.	King/Mount Albion	Traffic Signal	9	6.4
46.	King/Wellington	Traffic Signal	9	10.8
47.	King William/Emerald	1-Way Stop	9	3.0

LOCATIONS

	Intersection	Type of Traffic Control	Number of Collisions	5 Year Average
48.	Limeridge/Upper James	Traffic Signal	9	10.2
49.	Limeridge/Upper Wellington	Traffic Signal	9	- (1)
50.	Main/Cootes	Traffic Signal	9	9.6
51.	Main/Sherman	Traffic Signal	9	8.2
52.	Mohawk/Upper James	Traffic Signal	9	14.0
53.	Mohawk/Upper Sherman	Traffic Signal	9	6.2
54.	Rymal/Garth	Traffic Signal	9	- (1)
55.	York/Locke	Traffic Signal	9	12.0
56.	Barton/Birch	Traffic Signal	8	8.0
57.	Barton/Hughson	1-Way Stop	8	6.0
58.	Barton/Kenora	Traffic Signal	8	9.2
59.	Barton/Rosslyn	1-Way Stop	8	7.4
60.	Barton/Victoria	Traffic Signal	8	8.2
61.	Charlton/Park	1-Way Stop	8	4.4
62.	Fennell/Garth	Traffic Signal	8	8.6
63.	Fennell/Upper Gage	Traffic Signal	8	14.8
64.	King/Gray	Traffic Signal	8	5.0
65.	King/James	Traffic Signal	8	10.2
66.	Main/Graham	Traffic Signal	8	5.4
67.	Mohawk/Upper Gage	Traffic Signal	8	7.6
68.	Mohawk/Upper Wentworth	Traffic Signal	8	8.0
69.	Queensdale/Upper Wentworth	Traffic Signal	8	8.0 (2)
70.	Queenston/Walter	Traffic Signal	8	4.8
71.	Wilson/Catharine	Traffic Signal	8	4.6

(1) Installed 1985
(2) A one-year average
(a) Only collisions occurring within 31 feet (9.5m) of the intersection are defined as being "in" the intersection, and are included on this list.

Exhibit 7-3

SIGNALIZED INTERSECTIONS WITH HIGHEST COLLISION RATES IN 1985

Intersection	RL/RC	(a) RL	(b) RC	1984(c) AADT	Number of Collisions 1985	1984	1983	1982	5 YR AVG.	
1. Charlton/Sherman Access	1.91	2.13	1.11	16,245	15	9	12	16	13.2	
2. Fennell/Upper Ottawa	1.70	1.83	1.07	24,303	17	14	14	10	14.0	
3. Fennell/Upper Gage	1.69	1.80	1.06	24,242	8	15	20	13	14.8	
4. Fennell/Upper Wentworth	1.68	1.83	1.09	22,354	15	9	20	10	13.0	
5. Mohawk/Upper Paradise	1.62	1.69	1.04	28,844	13	14	15	20	15.6	
6. Hunter/Hess	1.59	2.00	1.26	9,143	5	6	9	5	6.0	
7. Queensdale/Upper Wentworth	1.57	1.86	1.19	13,943	8	-	-	-	8.0	(1)
8. Queenston/Centennial	1.53	1.47	0.96	47,177	25	31	19	16	23.4	
9. Barton/John	1.53	1.70	1.11	18,177	4	10	18	9	10.8	
10. Queensdale/Upper Gage	1.50	1.65	1.10	17,636	13	9	11	2	10.8	
11. Mohawk/Upper Ottawa	1.43	1.57	1.09	21,151	17	1	16	8	10.8	
12. Barton/Woodward	1.41	1.43	1.01	30,239	17	12	20	18	16.0	
13. Aberdeen/Dundurn	1.40	1.50	1.07	20,810	10	9	12	14	11.6	
14. Limeridge/Upper Gage	1.40	1.61	1.14	18,325	7	10	-	-	8.5	(2)
15. Main/Victoria	1.35	1.30	0.96	45,551	14	18	14	23	20.0	
16. Main/John	1.34	1.30	0.97	41,428	21	21	16	17	19.0	
17. Queenston/Nash	1.34	1.34	1.00	34,208	15	16	21	15	16.6	
18. Brampton/Parkdale	1.25	1.35	1.08	17,529	11	7	13	9	10.0	
19. Rymal/Upper James	1.21	1.25	1.03	30,556	11	15	11	14	12.4	
20. Charlton/Queen	1.20	1.37	1.14	15,120	6	5	9	5	7.4	
21. Hunter/John	1.18	1.26	1.07	21,184	10	12	10	7	10.0	
22. Fennell/Upper Sherman	1.18	1.23	1.04	25,747	4	7	14	11	11.4	

LOCATIONS

Intersection	RL/RC	(a) RL	(b) RC	1984(c) AADT	Number of Collisions 1985	1984	1983	1982	5 YR AVG.	
23. King/Centennial	1.17	1.15	0.98	41,854	13	11	22	14	15.4	
24. Charlton/Hess	1.15	1.44	1.26	9,900	4	5	7	2	4.4	
25. Main/Parkdale	1.11	1.21	1.09	20,809	6	9	6	9	8.6	
26. Britannia/Kenilworth	1.06	1.18	1.12	17,750	13	8	4	4	7.2	
27. Limeridge/Upper James	1.06	1.10	1.04	27,359	9	10	10	11	10.2	
28. Main/Dundurn	1.04	0.98	0.95	43,955	10	17	22	17	16.8	
29. Aberdeen/Queen	1.04	1.06	1.01	31,968	5	7	16	13	11.6	
30. York/Dundurn	1.03	1.02	0.99	34,977	16	7	10	11	13.0	
31. King William/Catharine	1.02	1.36	1.33	4,933	2	2	1	7	3.0	
32. Cootes/Olympic	1.02	1.12	1.09	18,862	3	11	9	-	7.7	(3)

(1) A 1-Year Average
(2) A 2-Year Average
(3) A 3-Year Average

NOTES:

(a) RL is the number of collisions per million vehicles entering occurring within 31 feet of an individual intersectionin 1985.

(b) RC is a volume-adjusted critical rate. If RL exceeds RC (i.e. $\frac{RL}{RC}$ is greater than 1.00), one can state with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.

$$RC = Ra + K \sqrt{\frac{Ra}{m} - \frac{0.5}{m}}$$

where Ra = systemwide average collision rate for all traffic signal locations (0.66 collisions per million vehicle entries in 1985.)

K = constant = 1.65 (for 95% confidence level)

m = vehicle exposure at the location in million vehicles entering per year $\frac{(AWDT \times 349.6)}{106}$

(c) AWDT - Average Weekday Daily Traffic; AADT - Average Annual Daily Traffic.

Exhibit 7-4

OVERALL COLLISION RATES
FOR SELECTED GROUPS OF SIGNALIZED INTERSECTIONS

	Data for 1985 Only		Data for 1981-1985	
Intersections Included	Avg. No. of Collisions Per Year	Rate (Collisions/ Million Vehicles Entering)	Avg. No. of Collisions Per Year	Rate (Collisions Million Vehicles Entering)
All intersections	4.94	0.60	5.41	0.66
Intersections of one-way streets with one-way streets	4.83	0.56	5.56	0.64
Intersections of one-way streets with two-way streets	3.96	0.48	4.37	0.53
Intersections of two-way streets with two-way streets	5.31	0.66	5.67	0.71
Central business district intersections	4.96	0.57	5.44	0.62
C.B.D. fringe or industrial intersections	4.81	0.59	5.15	0.63
Suburban shopping-type intersections	5.82	0.63	6.46	0.70
Residential area intersections	4.01	0.57	4.30	0.61
All lower city intersections	4.93	0.58	5.39	0.63
All mountain intersections	5.26	0.70	5.93	0.79

THERE HAVE BEEN NO MARKED CHANGES IN THE OVERALL COLLISION RATES FROM 1984 TO 1985. HOWEVER, THERE HAVE BEEN SOME CHANGES IN THE INDIVIDUAL SUBSECTIONS.

Exhibit 7-5

ROADWAY SECTIONS WITH THE HIGHEST COLLISION RATES, 1981 - 1985
CITY OF HAMILTON ARTERIALS
(ALL INTERSECTIONS INCLUDED) (a)

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
1.	Kenilworth	Main	Barton	275.5	11.93	4.86	2.45	1.031	12,820	4.62	14.07
2.	Charlton	James	John	48.0	16.00	6.70	2.39	.244	7,000	0.60	12.50
3.	Barton	James	Wellington	230.5	10.70	4.91	2.18	.836	14,753	4.31	9.51
4.	Barton	Wentworth	Sherman	219.0	8.85	4.82	1.84	.842	16,817	4.95	7.88
5.	Barton	Ottawa	Kenilworth	275.0	8.57	4.68	1.83	.860	21,355	6.42	6.85
6.	Barton	Gage	Ottawa	256.5	8.21	4.69	1.75	.860	20,775	6.25	6.16
7.	John	St. Josephs	King	215.0	8.41	4.80	1.75	.976	14,970	5.11	8.51
8.	John	King	Barton	106.5	9.26	5.36	1.73	.872	7,540	2.30	10.22
9.	James	King	Barton	130.5	8.73	5.16	1.69	.860	9,950	2.99	11.04
10.	Barton	Wellington	Wentworth	198.5	8.15	4.83	1.69	.872	15,987	4.87	6.67
11.	Charlton	Queen	James	117.0	8.83	5.25	1.68	.823	9,213	2.65	9.25
12.	Garth	Limeridge	Mohawk	38.0	10.13	6.44	1.57	.457	4,700	0.75	10.00
13.	Queen	Aberdeen	King	156.0	7.65	4.94	1.55	1.238	9,430	4.08	5.64
14.	Barton	Queen	James	90.5	8.19	5.39	1.52	.872	7,260	2.21	7.47
15.	Bay	Herkimer	King	115.5	7.80	5.16	1.51	.924	9,150	2.96	9.80
16.	Melvin	Walter	Parkdale	36.0	9.73	6.46	1.51	.403	5,270	0.74	10.14
17.	Barton	Sherman	Gage	208.0	6.93	4.71	1.47	.872	19,667	6.00	4.92
18.	Fennell	U. Ottawa	U. Kenilworth	55.5	8.35	5.84	1.43	.878	4,326	1.33	6.77
19.	Fennell	U. Gage	U. Ottawa	113.0	7.20	5.12	1.41	.824	10,895	3.14	4.94
20.	U. Wentworth	Mohawk	Fennell	70.5	7.83	5.56	1.41	1.037	4,955	1.80	8.06

(a) See Notes, Page 101

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
21.	Main	James	Wellington	272.5	6.34	4.53	1.40	.866	28,393	8.60	5.76
22.	Cannon	James	Wellington	166.5	6.59	4.81	1.37	.854	16,928	5.05	4.65
23.	Parkdale	Main	Barton	184.5	6.53	4.75	1.37	1.013	15,952	5.65	5.40
24.	Main	Queen	James	260.5	5.99	4.52	1.33	.830	29,980	8.70	5.34
25.	Barton	Nash	Centennial	206.0	6.06	4.65	1.30	.836	23,277	6.80	5.15
26.	U. Gage	Fennell	Concession	138.0	6.34	4.90	1.29	1.043	11,930	4.35	6.55
27.	James	Freeman	King	160.0	6.12	4.79	1.28	1.205	12,410	5.23	3.44
28.	U. Wentworth	Fennell	Concession	63.5	7.13	5.57	1.28	1.031	4,930	1.78	8.99
29.	Mohawk	U. Paradise	Garth	178.0	6.04	4.72	1.28	.839	20,095	5.89	5.69
30.	Ottawa	Main	Barton	143.0	6.19	4.86	1.27	1.031	12,820	4.62	5.09
31.	Markland	Queen	James	27.0	8.44	6.62	1.27	.823	2,230	0.64	6.25
32.	Fennell	U. Wentworth	U. Sherman	132.0	6.20	4.91	1.26	.854	14,255	4.26	5.63
33.	Wilson	James	Wellington	138.0	6.13	4.88	1.26	.860	14,965	4.50	6.11
34.	Ottawa	Barton	Industrial	162.5	5.73	4.74	1.21	1.279	12,673	5.67	4.76
35.	Wentworth	Charlton	King	63.0	6.63	5.52	1.20	.851	6,375	1.90	10.53
36.	King	James	Wellington	178.0	5.63	4.68	1.20	.878	20,582	6.32	4.59
37.	Main	Wellington	Wentworth	231.0	5.40	4.53	1.19	.854	28,636	8.55	5.91
38.	Charlton	Wellington	Wentworth	91.5	6.08	5.15	1.18	.854	10,085	3.01	6.15
39.	Cannon	Sherman	Gage	136.5	5.68	4.84	1.17	.891	15,443	4.81	5.82
40.	York	Queen	James	131.5	5.40	4.83	1.12	.921	15,120	4.87	4.93
41.	Queen	King	Barton	60.5	6.14	5.49	1.12	.823	6,830	1.97	5.08
42.	King	Wellington	Wentworth	189.5	5.09	4.60	1.11	.866	24,610	7.45	4.16
43.	Barton	Kenilworth	Parkdale	284.0	4.77	4.39	1.09	1.525	22,355	11.92	4.66
44.	Britannia	Barons	Strathearne	62.5	5.79	5.41	1.07	.488	12,685	2.16	2.08
45.	King	Parkdale	Nash	296.0	4.68	4.36	1.07	1.708	21,207	12.66	5.45
46.	Victoria	Stinson	King	63.5	5.64	5.37	1.05	.488	13,210	2.25	3.11

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
47.	Sherman	Main	King	43.0	6.01	5.77	1.04	.427	9,600	1.43	6.64
48.	U. James	Limeridge	Mohawk	188.0	4.77	4.57	1.04	1.049	21,490	7.88	4.89
49.	U. Wellington	Fennell	Concession	128.0	4.99	4.80	1.04	1.031	14,240	5.13	5.56
50.	King	Kenilworth	Parkdale	254.5	4.60	4.42	1.04	1.531	20,922	11.07	5.51
51.	Cannon	Gage	Ottawa	115.5	4.85	4.85	1.00	.866	15,735	4.76	3.47
52.	Bay	King	Barton	54.5	5.48	5.48	1.00	.854	6,660	1.99	5.53

Exhibit 7-6

ROADWAY SECTIONS WITH THE HIGHEST COLLISION RATES, 1981 - 1985
CITY OF HAMILTON ARTERIALS
(SIGNALIZED INTERSECTIONS NOT INCLUDED) (a)

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
1.	Charlton	James	John	44.0	14.67	4.90	2.99	.244	7,000	0.60	10.00
2.	Kenilworth	Main	Barton	213.5	9.24	3.51	2.63	1.031	12,820	4.62	9.31
3.	Barton	James	Wellington	173.0	8.03	3.54	2.27	.836	14,753	4.31	8.58
4.	Barton	Ottawa	Kenilworth	214.0	6.67	3.35	1.99	.860	21,355	6.42	5.30
5.	Barton	Gage	Ottawa	206.0	6.59	3.37	1.96	.860	20,775	6.25	4.64
6.	Barton	Queen	James	83.0	7.51	3.92	1.92	.872	7,260	2.21	6.79
7.	Markland	Queen	James	27.0	8.44	4.85	1.74	.823	2,230	0.64	6.25
8.	Charlton	Queen	James	87.0	6.57	3.81	1.72	.823	9,213	2.65	6.42
9.	Barton	Wentworth	Sherman	143.0	5.78	3.47	1.67	.842	16,817	4.95	4.44
10.	Barton	Wellington	Wentworth	140.0	5.75	3.48	1.65	.872	15,987	4.87	4.11
11.	U. Wentworth	Mohawk	Fennell	56.0	6.22	4.06	1.53	1.037	4,955	1.80	6.67
12.	Melvin	Walter	Parkdale	26.5	7.16	4.73	1.51	.403	5,270	0.74	8.11
13.	Barton	Sherman	Gage	151.0	5.03	3.38	1.49	.872	19,667	6.00	3.50
14.	Fennell	U. Ottawa	U. Kenilworth	39.0	5.86	4.27	1.37	.878	4,326	1.33	4.89
15.	Ottawa	Main	Barton	111.0	4.81	3.51	1.37	1.031	12,820	4.62	3.68
16.	James	King	Barton	76.0	5.08	3.74	1.36	.860	9,950	2.99	6.35
17.	Britannia	Barons	Strathearne	57.0	5.28	3.94	1.34	.488	12,685	2.15	1.85
18.	Ottawa	Barton	Industrial	129.0	4.55	3.41	1.33	1.279	12,673	5.67	3.35
19.	Fennell	U. Gage	U. Ottawa	77.0	4.90	3.71	1.32	.824	10,895	3.14	3.50
20.	King	Kenilworth	Parkdale	228.5	4.13	3.15	1.31	1.513	20,922	11.07	5.01
21.	Mohawk	U. Paradise	Garth	129.0	4.38	3.39	1.29	.839	20,095	5.89	4.41
22.	John	King	Barton	58.0	5.04	3.90	1.29	.872	7,540	2.30	5.22
23.	Wentworth	Charlton	King	48.0	5.05	4.02	1.26	.851	6,375	1.90	7.89
24.	Queen	Aberdeen	King	91.0	4.46	3.57	1.25	1.238	9,430	4.08	4.17

(a) See Notes, Page 101

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
25.	Fennell	U. Wentworth	U. Sherman	94.0	4.41	3.55	1.24	.854	14,255	4.26	4.23
26.	Garth	Limeridge	Mohawk	22.0	5.87	4.72	1.24	.457	4,700	0.75	5.33
27.	King	Wellington	Wentworth	151.0	4.05	3.29	1.23	.866	24,610	7.45	3.62
28.	Delaware	Wentworth	Sherman	43.5	4.92	4.07	1.21	.854	5,935	1.77	6.78
29.	Barton	Nash	Centennial	133.0	3.91	3.33	1.17	.836	23,277	6.80	3.09
30.	Cannon	Sherman	Gage	98.0	4.07	3.49	1.17	.891	15,443	4.81	4.16
31.	Parkdale	Main	Barton	112.0	3.96	3.41	1.16	1.013	15,952	5.65	3.54
32.	U. James	Limeridge	Mohawk	142.0	3.60	3.27	1.10	1.049	21,490	7.88	3.55
33.	Queenston	Nash	Hamilton City Limit	133.0	3.61	3.30	1.09	.823	25,585	7.36	2.58
34.	Nash	King	Queenston	75.0	3.92	3.60	1.09	1.037	10,575	3.83	2.09
35.	Sherman	Main	King	33.0	4.62	4.22	1.09	.427	9,600	1.43	4.20
36.	Wentworth	Barton	Burlington	44.0	4.27	3.97	1.08	1.031	5,725	2.06	2.43
37.	James	Freeman	King	97.0	3.71	3.45	1.08	1.205	12,410	5.23	2.68
38.	U. Wellington	Fennell	Concession	96.0	3.74	3.46	1.08	1.031	14,240	5.13	4.48
39.	King	Gage	Main	78.0	3.88	3.58	1.08	.610	18,830	4.02	3.73
40.	Barton	Kenilworth	Parkdale	201.0	3.37	3.12	1.08	1.525	22,355	11.92	3.10
41.	Main	Kenilworth	Berry	103.5	3.59	3.40	1.06	.702	23,500	5.77	4.33
42.	Mohawk	U. Sherman	U. Gage	76.0	3.75	3.57	1.05	.781	14,835	4.05	3.21
43.	Bay	Herkimer	King	58.0	3.92	3.74	1.05	.924	9,150	2.96	5.41
44.	James	Barton	Burlington	41.5	4.17	3.99	1.05	1.013	5,630	1.99	6.53
45.	Charlton	John	Wellington	28.0	4.41	4.30	1.03	.610	5,960	1.27	7.09
46.	Main	Sherman	Gage	122.0	3.37	3.30	1.02	.872	23,767	7.25	3.59
47.	King	Parkdale	Nash	198.0	3.13	3.10	1.01	1.708	21,207	12.66	3.48
48.	Cannon	Gage	Ottawa	83.0	3.49	3.49	1.00	.866	15,735	4.76	2.31
49.	U. James	Fennell	Rosedene	119.0	3.32	3.31	1.00	.854	24,023	7.17	3.42

Exhibit 7-7

ROADWAY SECTIONS WITH THE HIGHEST COLLISION RATES, 1981 - 1985
CITY OF HAMILTON ARTERIALS
(INTERSECTIONS NOT INCLUDED) (a)

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
1.	Barton	Ottawa	Kenilworth	127.0	3.96	2.21	1.79	.860	21,355	6.42	3.27
2.	Barton	Nash	Centennial	133.0	3.91	2.19	1.79	.836	23,277	6.80	3.09
3.	Fennell	U. Gage	U. Ottawa	66.0	4.20	2.47	1.70	.824	10,895	3.14	2.87
4.	Mohawk	U. Paradise	Garth	102.0	3.46	2.23	1.55	.839	20,095	5.89	3.23
5.	Kenilworth	Main	Barton	80.0	3.46	2.32	1.49	1.031	12,820	4.62	2.81
6.	U. James	Limeridge	Mohawk	122.0	3.10	2.14	1.45	1.049	21,490	7.88	2.79
7.	Garth	Limeridge	Mohawk	17.0	4.53	3.15	1.44	.457	4,700	0.75	4.00
8.	Barton	James	Wellington	72.0	3.34	2.34	1.43	.836	14,753	4.31	3.48
9.	Parkdale	Main	Barton	88.0	3.12	2.25	1.39	1.013	15,952	5.65	3.19
10.	Barton	Gage	Ottawa	94.0	3.01	2.21	1.36	.860	20,775	6.25	1.12
11.	Fennell	U. Ottawa	U. Kenilworth	25.0	3.76	2.86	1.31	.878	4,326	1.33	3.76
12.	U. Wentworth	Mohawk	Fennell	32.0	3.56	2.71	1.31	1.037	4,955	1.80	3.89
13.	Ottawa	Barton	Industrial	83.0	2.93	2.25	1.30	1.279	12,673	5.67	1.94
14.	James	King	Barton	47.0	3.14	2.49	1.26	.860	9,950	2.99	3.68
15.	John	King	Barton	37.0	3.22	2.60	1.24	.872	7,540	2.30	3.48
16.	Queenston	Nash	Hamilton City Limit	95.0	2.58	2.16	1.19	.823	25,585	7.36	1.63
17.	Quigley	Greenhill	King	58.0	2.78	2.36	1.18	1.428	8,365	4.18	4.07
18.	Main	James	Wellington	107.0	2.49	2.12	1.17	.866	28,393	8.60	2.21
19.	Markland	Queen	James	12.0	3.75	3.23	1.16	.823	2,230	0.64	3.13
20.	King	Parkdale	Nash	147.0	2.32	2.02	1.15	1.708	21,207	12.66	2.61

(a) See Notes, Page 101

	Arterial Street	From	To	Number of Collisions	RL	RC	Ratio	Link Length	Link Volume	Million Veh-Km	1985 RL
21.	Barton	Wentworth	Sherman	65.0	2.63	2.29	1.15	.842	16,817	4.95	1.41
22.	Charlton	James	John	11.0	3.67	3.26	1.13	.244	7,000	0.60	1.67
23.	Nash	King	Queenston	51.0	2.66	2.39	1.11	1.037	10,575	3.83	1.31
24.	Barton	Wellington	Wentworth	61.0	2.51	2.30	1.09	.872	15,987	4.87	1.44
25.	Barton	Sherman	Gage	72.0	2.40	2.23	1.08	.872	19,667	6.00	1.33
26.	Mount Albion	Greenhill	King	56.0	2.48	2.33	1.06	1.171	11,030	4.52	2.21
27.	Ottawa	Main	Barton	56.0	2.42	2.32	1.04	1.031	12,820	4.62	2.16
28.	Fennell	U. Wentworth	U. Sherman	52.0	2.44	2.35	1.04	.854	14,255	4.26	2.11
29.	Barton	Kenilworth	Parkdale	125.0	2.10	2.03	1.03	1.525	22,355	11.92	1.93
30.	Melvin	Walter	Parkdale	12.0	3.24	3.16	1.03	.403	5,270	0.74	1.35
31.	Wentworth	Charlton	King	26.0	2.74	2.69	1.02	.851	6,375	1.90	2.63
32.	York	Queen	James	57.0	2.34	2.30	1.02	.921	15,120	4.87	1.85
33.	King	Wentworth	Sherman	68.0	2.26	2.23	1.01	.897	19,227	6.03	1.66
34.	Queenston	Parkdale	Nash	119.0	2.07	2.04	1.01	1.623	20,286	11.51	1.74
35.	Main	Queen	James	92.0	2.11	2.12	1.00	.830	29,980	8.70	1.95
36.	James	Freeman	King	59.0	2.26	2.27	1.00	1.205	12,410	5.23	1.53

NOTES: Re: Collision Rates on Roadway Sections

(a) Exhibit 7-5 includes all collisions on an arterial roadway section. If the roadway section ends at an intersection, signalized or unsignalized, one-half the number of collisions occurring at the intersection is included.

(b) Exhibit 7-6 includes all collisions on an arterial roadway section excluding those which occur within nine metres of a signalized intersection. If the roadway section ends at an unsignalized intersection, one-half the number of collisions occurring at the intersection is included.

(c) Exhibit 7-7 includes only collisions on an arterial roadway section which occur greater than nine metres from any intersection. That is, no collisions referenced to an intersection, signalized or unsignalized, are included.

(d) R_L is the collision rate for the roadway section expressed as collisions per million vehicle kilometres travelled per annum.

(e) R_C is a volume-adjusted critical rate. If R_L exceeds R_C (i.e. $\frac{R_L}{R_C}$ is greater than 1.00), one can state with 95 percent confidence that the collision rate for the roadway section in question is significantly higher than would normally be expected.

$$R_C = R_a + K\sqrt{\frac{R_a}{m}} - \frac{0.5}{m}$$

where R_a = systemwide average collision rate for all roadway sections (3.53 collisions per million vehicle kilometers in 1981-1985 for Exhibit 7-5; 2.42 collisions per million vehicle kilometres in 1981-1985 for Exhibit 7-6; 1.49 collisions per million vehicle kilometres in 1981-1985 for Exhibit 7-7).

K = constant = 1.65 (for 95% confidence level)

m = vehicle exposure for the individual roadway section in million vehicle kilometres per year (AWDT x $\frac{349.6}{10^6}$ x Section Length)

(f) AWDT - Average Weekday Daily Traffic

Exhibit 7-8

ARTERIAL ROADWAY SECTIONS
COLLISION RATES
FOR SELECTED GROUPS

Category	Collision Rate (Collisions Per Million Vehicle Kilometres)		
	Including All Intersections	Signalized Intersections Not Included	Intersections Not Included
All Arterials 1985	3.53	2.42	1.49
All Arterials 1984	3.34	2.31	1.42
All Arterials 1983	3.34	2.30	1.38
All Arterials 1982	3.59	2.47	1.48
All Arterials 1981	4.04	2.69	1.66
All Arterials 1980	4.00	2.65	1.61
All Arterials 1979	4.33	2.90	1.76
All Arterials 1978	4.06	2.77	1.63
All Arterials 1977	4.74	3.25	2.01
All Arterials 1981 - 85	3.57	2.44	1.49

ROADWAY SECTION COLLISION RATES, INCLUDING ALL INTERSECTIONS, HAVE DISPLAYED A 26 PERCENT DECLINE FROM 1977 - 1985.

ROADWAY SECTION COLLISION RATES, EXCLUDING SIGNALIZED INTERSECTIONS, HAVE DISPLAYED A 26 PERCENT DECLINE FROM 1977 - 1985.

ROADWAY SECTION COLLISION RATES, EXCLUDING THE EFFECTS OF ALL INTERSECTIONS, HAVE DISPLAYED A 26 PERCENT DECLINE FROM 1977 - 1985.

Appendix Sheet

Exhibit A-1

CAUSES OF DEATH 1983 (1)

Cause	Mortality Rate/100,000 Population Canada	Ontario
Diseases of the Heart	195.0	200.3
All Malignant Neoplasms	147.6	149.2
All Accidents and Adverse Effects (Including Late Effects)	51.8 (2)	44.6 (2)
Cerebrovascular Disease	46.0	47.6
Respiratory Diseases (Excluding Infectious and Parasitic Diseases)	45.0	42.6
Diabetes Mellitus	10.2	10.2
Atherosclerosis	9.4	10.0
Chronic Liver Disease and Cirrhosis	8.5	8.6
Congenital Anomalies	6.2	5.9
Causes of Perinatal Mortality Excluding Stillbirths	6.0	5.7
All Other Causes Not Specified in the Above List	70.0	72.3
All Causes	595.7	597.0

NOTES: (1) From Statistics Canada, Vital Statistics, Volume III, Mortality, 1983, p. 20-23. (Male and Female Combined).

(2) Motor Vehicle Collisions Alone - 16.6 for Canada, 13.4 for Ontario.

Exhibit A-2

ACCIDENTAL CAUSES OF DEATH 1983 (1)

Cause	Number		Death Rate/100,000	
	Canada	Ontario	Canada	Ontario
Traffic Accidents	4,156	1,185	16.7	13.4
Accidental Falls	1,773	723	7.1	8.2
Fires	502	132	2.0	1.5
Drowning	503	162	2.0	1.8
Other Transport	404	126	1.6	1.4
Accidental Poisoning	440	169	1.8	1.9
Suffocation	396	147	1.6	1.7
Motor Vehicle (non-traffic related)	161	52	0.6	0.6
Explosives, Acid, Electricity	92	29	0.4	0.3
Firearms	41	9	0.2	0.1
Lightning	4	2	0.0	0.0
All Other	711	212	2.9	2.4

(1) Statistics Canada, Vital Statistics, Volume III, Mortality, 1983, p. 92-95.

Exhibit A-3

ACCIDENTAL CAUSES OF DEATH 1983 (14 YRS. OF AGE AND UNDER) (1)

Cause	Number of Fatalities In Canada
Traffic Accidents	346
Fires	104
Drowning	125
Suffocation	78
Other Transport	20
Accidental Falls	32
Firearms	13
Motor Vehicle (Non-Traffic Related)	38
Accidental Poisoning	10
Explosives, Acid, Electricity	3
Lightning	0
All Other	109
TOTAL	878

(1) Statistics Canada, Volume III, Mortality, 1983, p. 54-57.

Exhibit A-4

POPULATION AND VEHICLE REGISTRATION

Year	Population	Motor Vehicle Registration (a)		Ratio: Motor Vehicle Registration to Population
	Hamilton(e)	Ontario	Hamilton	
1950	n/a	1,104,080	47,043	
1951	201,296	1,205.098	50,648	0.25
1952	210,060	1,291,753	55,169	
1953	216,921	1,406,119	59,808	
1954	222,907	1,489,980	62,728 (b)	
1955	225,608	1,617,853	67,497	
1956	233,019	1,710,240	70,034 (b)	0.30
1957	243,097	1,793,499	72,156	
1958	251,256	1,868,922	75,763	
1959	258,576	1,973,737	80,365	
1960	263,750	2,062,484	82,823	
1961	266,707	2,126,270	85,667	0.32
1962	268,908	2,177,148	83,779	
1963	264,706	2,268,320	89,005	
1964	278,260	2,381,219	93,208	
1965	283,099	2,516,680	102,171	
1966	285,649	2,643,474	107,506	0.38
1967	291,536	2,736,366	107,521	
1968	293,397	2,869,588	116,452	
1969	296,875	2,953,789	116,135	
1970	298,755	3,047,599	114,760	
1971	303,177	3,209,862	120,727	0.39
1972	304,391	3,382,497	134,623 (b)	
1973	305,382	3,583,379	140,687	
1974	401,932(e)	3,891,603	154,886 (d)	
1975	408,466	4,079,108	162,348 (d)(g)	
1976	409,331	4,089,954(c)	162,780 (d)	0.52 (f)
1977	411,358	4,274,410(c)	170,122 (d)	
1978	407,486	n/a	228,149 (h)	
1979	407,758	n/a	190,884 (h)	

Year	Population	Motor Vehicle Registration (a)		Ratio: Motor Vehicle Registration to Population
	Hamilton(e)	Ontario	Hamilton	
1980	410,503	n/a	230,459 (h)	0.56 (j)
1981	412,339(h)	n/a	277,813 (h)	0.68 (j)
1982	414,175	n/a	296,288 (h)	0.71 (j)
1983	416,538(b)	n/a	n/a	
1984	418,901(b)	7,170,858(k)	326,587(k)	0.78 (j)
1985	421,264	n/a	n/a	

NOTES:

(a) Registration is for all vehicles including passenger and commercial vehicles, buses, motorcycles and mopeds.

(b) Data not available. Estimated from provincial value.

(c) Estimated by the Ministry of Transportation and Communications.

(d) Data estimated from provincial value for City of Hamilton only.

(e) From 1973 on, population figures are for the Regional Municipality of Hamilton-Wentworth.

(f) For City of Hamilton only.

(g) R. L. Polk estimate for Region of Hamilton-Wentworth for 1975 - 180,084.

(h) Ministry of Transportation and Communications estimate for Region based on licence sales only, for Regional Hamilton-Wentworth.

(j) For Regional Municipality of Hamilton-Wentworth.

(k) Ministry of Transportation and Communications figures includes active, inactive, unfit, wrecked, out-of-province and sold vehicles.

Exhibit A-5

MOTOR VEHICLE ACCIDENT DEATHS AND RATES

YEAR	DEATHS			RATES/10,000 REGISTERED MOTOR VEHICLES		
	Canada	Ontario	Hamilton	Canada	Ontario	Hamilton
1931	1,316 (a)	574	31	10.96(a)	10.21	
1932	1,120	497	20	10.05	9.35	
1933	955	416	22	8.82	8.00	
1934	1,115	528	27	9.82	9.74	
1935	1,224	571	16	10.42	10.12	
1936	1,316	564	23	10.61	9.56	
1937	1,642	774	39	12.37	12.41	
1938	1,545	677	33	11.08	10.12	
1939	1,584	682	35	11.01	9.99	n/a
1940	1,723	756	46	11.46	10.74	
1941	1,852	835	45	11.78	11.30	
1942	1,409	610	49	9.24	8.53	
1943	1,437	563	41	9.51	8.14	
1944	1,374	526	28	9.14	7.79	
1945	1,556	637	25	10.39	9.61	
1946	1,781	729	33	10.98	10.25	
1947	1,869	753	26	10.17	9.41	
1948	2,086	782	19	10.25	8.94	5.34
1949	2,265	873	29	9.89	9.00	n/a
1950	2,270	850	12	8.74	7.70	2.55
1951	2,686	991	26	9.36	8.22	5.13
1952	2,701	1,040	26	8.56	8.05	4.71
1953	2,906	1,082	17	8.47	7.69	2.84
1954	1,960 (a)	1,045	17	5.38	7.01	2.71
1955	2,084	1,111	15	5.28	6.87	2.22
1956	3,184	1,180	25	7.46	6.90	3.57
1957	3,260	1,279	25	7.25	7.13	3.46
1958	3,118	1,112	21	6.61	5.94	2.77

YEAR	DEATHS			RATES/10,000 REGISTERED MOTOR VEHICLES		
	Canada	Ontario	Hamilton	Canada	Ontario	Hamilton
1960	3,283	1,166	21	6.25	5.65	2.54
1961	3,426	1,286	19	6.21	6.05	2.22
1962	3,883	1,383	32	6.72	6.35	3.82
1963	4,210	1,421	27	6.93	6.26	3.03
1964	4,652	1,424	32	7.29	5.98	3.43
1965	4,902	1,611	27	7.31	6.40	2.64
1966	5,281	1,596	28	7.51	6.04	2.60
1967	5,429	1,719	39	7.26	6.28	3.63
1968	5,318	1,586	22	6.74	5.53	1.89
1969	5,425	1,683	19	6.57	5.70	1.64
1970	5,080	1,535	23	5.97	5.04	2.00
1971	5,573	1,769	23	6.17	5.51	1.91
1972	6,221	1,934	46	6.56	5.72	3.42
1973	6,706	1,959	23	6.60	5.47	1.63
1974 (b)	6,290	1,748	31	5.72	4.49	2.00
1975	6,061	1,800	26	5.29	4.41	1.60
1976		1,511	29		3.70	1.78
1977	n/a	1,420	34	n/a	3.27	2.00
1978		1,450	47		3.23	2.06
1979		1,560	42		3.36	2.20
1980		1,508	33		3.17	1.43
1981		1,445	31		2.86	1.16
1982		1,138	23		1.88	0.77
1983		1,204	20			n/a
1984			18			
1985	4,317		26			

(a) Except Quebec.

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit A-6

HAMILTON/HAMILTON-WENTWORTH
PEDESTRIAN INJURY RATES
HISTORIC TRENDS

YEAR	PEDESTRIAN	
	Injuries Per 1,000 Population	Fatalities Per 100,000 Population
1951	1.41	7.45
1952	2.13	6.19
1953	2.14	4.14
1954	1.97	5.83
1955	2.29	3.10
1956	1.92	9.01
1957	2.16	6.17
1958	1.78	5.57
1959	1.76	5.03
1960	1.60	4.93
1961	1.96	4.12
1962	1.84	4.83
1963	2.11	5.67
1964	1.89	7.19
1965	2.05	6.00
1966	2.07	5.95
1967	1.89	5.83
1968	2.11	3.41
1969	2.03	2.02
1970	1.81	4.69
1971	1.84	4.29
1972	1.76	6.90
1973	1.87	2.95
1974 (a)	1.41	3.23
1975	1.28	2.69
1976	1.18	3.42
1977	1.22	2.43
1978	1.34	6.14
1979	1.14	3.68
1980	1.03	2.93
1981	1.13	2.50
1982	1.00	2.46
1983	0.95	1.23
1984	0.77	1.47
1985	0.96	0.71

Note: See also Exhibit 1-2 (a) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit A-7

TRENDS DATA
REGRESSION EQUATIONS

Statistic	Years	Equation (a)	Significant Slope at 95%	99% (b)	Range of Significant Slope at 95%
1. Collision Rate - All (c)	1951-1985	y = -0.232 x + 30.16	Yes	No	-0.616 to 0.151
2. Collision Rate - All (c)	1965-1985	y = -0.884 x + 34.54	Yes	Yes	-1.187 to -0.581
3. Injury Collision Rate	1954-1985	y = 0.069 x + 6.49	Yes	No	-0.042 to 0.181
4. Injury Collision Rate	1965-1985	y = -0.131 x + 9.82	Yes	Yes	-0.229 to -0.033
5. Personal Injury Rate	1951-1985	y = 0.180 x + 6.83	Yes	Yes	0.031 to 0.329
6. Personal Injury Rate	1963-1985	y = -0.113 x + 13.19	Yes	Yes	-0.270 to 0.044
7. Pedestrian Injury Rate	1951-1985	y = -0.034 x + 2.26	Yes	Yes	-0.052 to -0.015
8. Fatality Rate - All Collisions	1951-1985	y = -0.103 x + 10.52	Yes	No	-0.269 to 0.063
9. Pedestrian Fatality Rate	1951-1985	y = -0.130 x + 6.75	Yes	Yes	-0.228 to -0.032

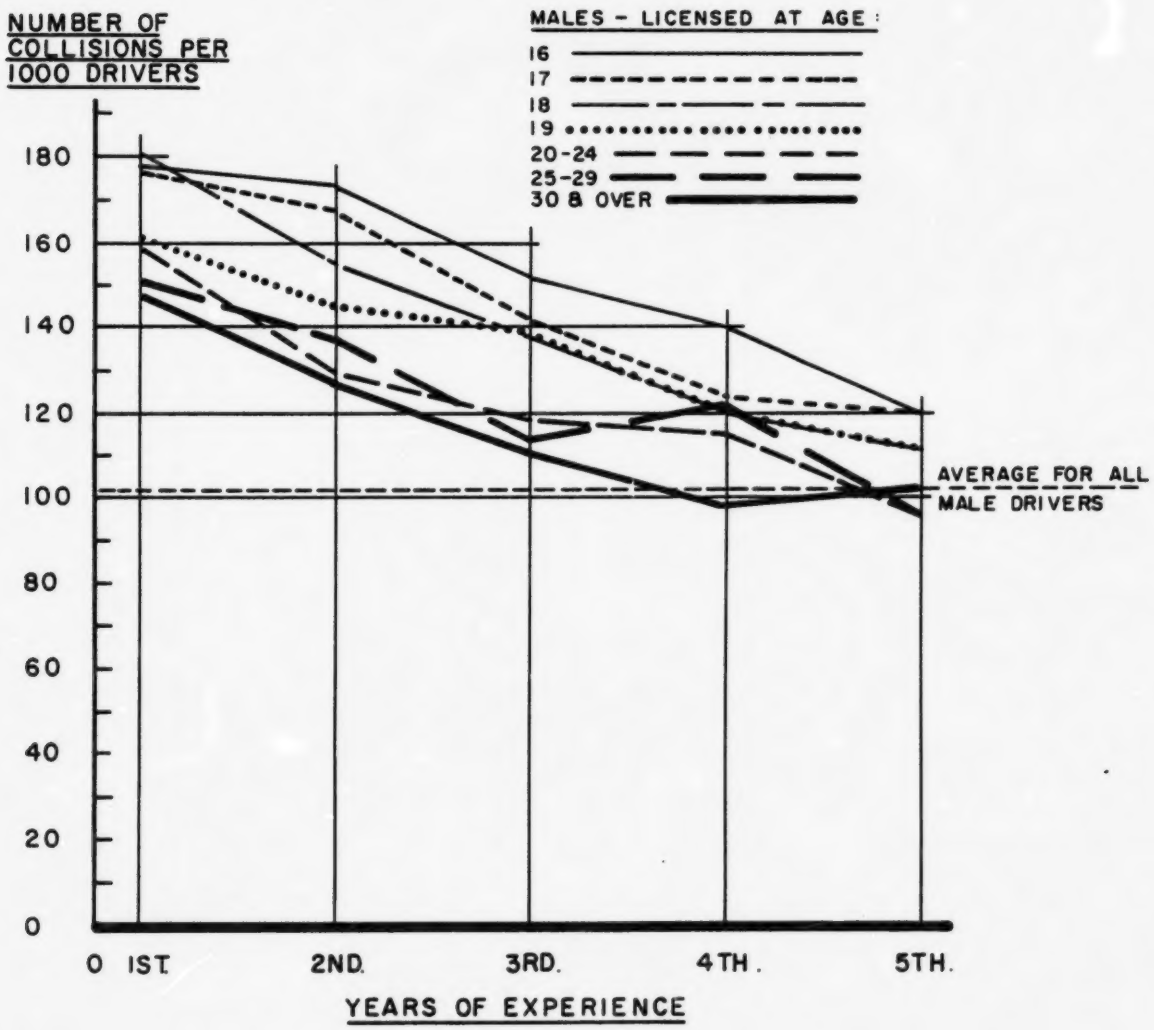
(a) The variable "x" represents the year; "y" the number of collisions expected.
"x" is 1.0 for the first year included in the equation.
"y" is in collisions per 1,000 population for 1 and 2; in injuries per 1,000 population for 3,4 and 5; and in fatalities per 100,000 population in 6 and 7.

(b) If the slope of the regression line is significant, it can be stated with the indicated level of confidence that the slope is not equal to zero.

(c) Includes changes in reporting criteria and reporting area. For this reason, caution should be exercised in drawing any conclusions drawn from this regression line.

APPENDIX A-8

EFFECT OF EXPERIENCE ON COLLISION INVOLVEMENT OF NEW DRIVERS



SOURCE - SYSTEMS RESEARCH & DEVELOPMENT,
ONTARIO MINISTRY OF TRANSPORTATION & COMMUNICATIONS

Exhibit A-9

COLLISION STATISTICS - SELECTED CANADIAN CITIES

CITY OR REGIONAL MUNICIPALITY	POPULATION	PROPERTY DAMAGE ONLY - COLLISION REPORTING LEVEL	COLLISION REPORTING CRITERIA (1) (A)	(B)	(C)	(D)	OTHER	TOTAL COLLISIONS	COLLISIONS/ 1,000 POPULATION	INJURY COLLISIONS	COLLISIONS/ 1,000 POPULATION
Regional Hamilton-Wentworth	421,264 (1985)	$700-	N	N	Y	Y	(f)	7,346	17.4	3,153	7.5
Hamilton	307,960 (1985)	$700-	N	N	Y	Y	(f)	5,870	19.1	2,541	8.3
Burlington	117,000 (1984)							1,805		N/A	
Calgary	625,143 (1985)	$500-	Y	Y	Y	Y	(f)	36,041	57.6	1,910	3.0
Edmonton	560,085 (1985)	$500-	N	N	N	Y		25,211	45.0	4,880	8.7
Halifax	115,000 (1985h)	$500-	Y	Y	Y	Y		5,299	46.1	479	4.2
London	275,000 (1985)	$700-	Y	Y	Y	Y		8,575	31.2	2,338	8.5
Mississauga (4)	368,720 (1985h)	$700-	N	N	N	Y		3,806	10.3	1,393	3.8
Montreal	1,020,720 (1985)	$250-	N	N	N	Y		29,415(g)	28.8	6,818	6.7
Regina (2)	174,800 (1985h)	$500-	N	N	N	Y	(f)	7,037	40.2	1,424	8.1
Saskatoon	175,859 (1985)	$500-	N	N	N	Y		7,618	43.3	903	5.1
Toronto (Metro) (3)	2,137,960 (1983)	$700-	Y	Y	Y	Y	(e,f)	42,721	20.0	17,667	8.3
St. Catharines (4)	123,014 (1985)	$700-	Y	Y	Y	Y	(e,f)	5,369	43.6	1,288	10.5
Vancouver, Canada											
Windsor	195,028 (1985)	$700-	Y	Y	Y	Y		4,740	24.3	1,960	10.0
Winnipeg	611,732 (1985)	$500-	Y	Y	Y	Y		20,455	33.4	4,796	7.8
Region of Halton	264,498 (1985)	$700-	N	N	N	Y		4,190	15.8	1,435	5.4

CITY OR REGIONAL MUNICIPALITY	POPULATION	PROPERTY DAMAGE ONLY - COLLISION REPORTING LEVEL	COLLISION REPORTING CRITERIA (1) (A)	(B)	(C)	(D)	OTHER	TOTAL COLLISIONS	COLLISIONS/ 1,000 POPULATION	INJURY COLLISIONS	COLLISIONS/ 1,000 POPULATION
Regional Niagara	369,312 (1985)	$700-	Y	Y	Y	Y	(e,f)	13,556	36.7	3,288	8.9
Regional Ottawa-Carleton	599,437 (1985)	$700-	Y	Y	Y	Y	(f)	15,425	25.7	4,563	7.6
Regional Waterloo	328,224 (1985)	$700-	N	Y	Y	Y	(e,f)	8,868	27.0	1,783	5.4

(1) KEY TO CRITERIA FOR REPORTING COLLISIONS (Seen next page for definition of injury collisions)
It is generally assumed, unless otherwise noted, that only collisions occurring on public roadways involving personal injury or property damage greater than the reporting level are included on this table.
- (a) Collisions reported involving an infraction of the Provincial Highway Traffic Act with property damage only and less than reporting level.
- (b) Collisions reported involving an infraction of the Criminal Code of Canada with property damage only and less than reporting level.
- (c) Hit and run collisions reported with property damage only and less than reporting level.
- (d) Collision reported if it involves any personal injury.
- (e) Public property damage collisions.
- (f) Collisions involving City or Regional government vehicles.
- (g) "With the introduction of amicable constat by insurance companies in July, 1979, a great number of accidents with material damages are not reported and are out of control".
- (h) estimated.

(2) Only injuries requiring medical attention were classified as injury collisions.
(3) Injury collisions do not include fatal accidents.
(4) Not including Regional roads or kings highways.

DEFINITIONS OF "PERSONAL INJURY" (a)

Regional Hamilton-Wentworth	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
City of Hamilton	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
Burlington	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
Calgary	- any type of injury resulting from a collision.
Edmonton	- including minor abrasions and bruises, complaint of pain, caused by a motor vehicle collision.
Halifax	- injury or death (no stipulation regarding severity of injury) caused by a motor vehicle collision.
London	- any type of injury, visible or complained of, caused by a collision; need not be treated at a hospital.
City of Montreal	- any injury, apparent or not, to any person, caused directly or indirectly, by a motor vehicle.
Regional Ottawa-Carleton	- injury is any bodily harm visible or complaint of, caused by a motor vehicle collision.
City of Regina	- any bodily harm, visible or complaint of, caused by the accident.
Saskatoon	- any bodily harm, visible or complaint of, caused by a collision.
Metro Toronto	- injury must be reported when an injury occurs to any of the involved persons in a collision.
Vancouver	- up to discretion of driver or police if in attendance.
Windsor	- any injury resulting from a motor vehicle collision.
Winnipeg	- readily identifiable injury or perceived injury caused by a collision.
Region Halton	- same as Burlington.

DEFINITIONS OF "PERSONAL INJURY" (a) CONTINUED

Mississauga	- N/A
St. Catharines	- any type of injury resulting from a collision.
Regional Niagara	- any type of injury resulting from a collision.
Regional Waterloo	- injury or death (no stipulation regarding severity of injury) caused by a motor vehicle collision.

(a) definitions of a "personal injury" such that a collision involving a personal injury must be reported.

Exhibit A-10

FATAL COLLISION STATISTICS - CANADIAN (1) AND U.S. CITIES - 1984

CITY (2)	# OF FATALITIES 1984	RATE PER 100,000 POPULATION	RATE PER 10,000 REGISTERED VEHICLES
HAMILTON	**18**	**4.3**	**0.55**
AVERAGE OF ALL U.S. CITIES, POPULATION 200,000 - 350,000 REPORTING TO N.S.C. (26 CITIES)	37.3	13.8	2.0
Austin, Tex.	85	26.6	4.9
Tampa, Fla.	62	23.5	2.6
Anchorage, Alas.	37	18.3	2.3
Albuquerque, N.M.	53	18.0	2.5
Tucson, Ariz.	60	18.1	2.7
Charlotte, N.C.	52	17.4	3.1
Miami, Fla.	55	15.8	1.9
Birmingham, Ala.	42	15.0	1.9
Colorado Springs, Colo.	30	14.5	1.8
Sacramento, Cal.	39	14.2	1.7
Virginia Beach, Va.	32	13.1	3.0
Shreveport, La.	26	12.9	1.7
Long Beach, Cal.	43	12.7	1.8
Anaheim, Cal.	23	11.1	1.3
Baton Rouge, L.A.	34	10.9	2.3

CITY	# OF FATALITIES 1984	RATE PER 100,000 POPULATION	RATE PER 10,000 REGISTERED VEHICLES
Wichita, Kans.	29	10.8	1.2
Louisville, Ky.	34	10.7	1.3
Norfolk, V.A.	30	10.7	2.3
Mobile, Ala.	22	10.6	1.9
Akron, Ohio	25	10.5	1.3
Newark, N.T.	30	9.5	1.9
Tulsa, Okla.	26	7.8	1.1
Richmond, Va.	17	7.7	1.2
Oakland, Cal.	25	7.4	1.2
Rochester, N.Y.	9	3.7	0.5

NOTE:

(1) SOURCE: Accident Facts, 1984 Edition, National Safety Council, 444 N. Michigan Avenue, Chicago, Ill. Please note statistics are for 1984 calendar year.

(2) Rate is for City of Hamilton only.